

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

MASIMO CORPORATION,
Petitioner

v.

APPLE INC.,
Patent Owner

Case No. To Be Assigned
U.S. Patent No. D947,842

DECLARATION OF JOEL DELMAN

I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

I reserve the right to supplement my opinions in the future to respond to any arguments or positions Apple may raise, taking account of new information as it becomes available to me.

Dated: 3/8/23

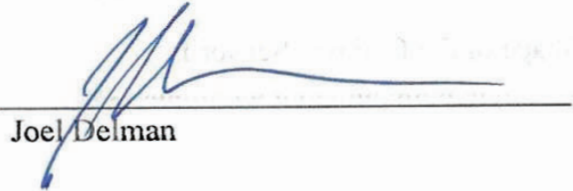

Joel Delman

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I, Joel Delman, declare and state as follows:

I. INTRODUCTION

1. I have been retained by Knobbe, Martens, Olson & Bear, LLP, counsel for Masimo Corporation (“Masimo”). I am making this declaration at the request of Masimo in connection with Masimo’s petition for *inter partes* review (“IPR”) of the design claimed by (the “Challenged Claim” of) U.S. Patent D947,842 (the “D’842 Patent”). I understand that this Declaration is being submitted in the above-captioned proceeding as Exhibit 1003.

2. I am being compensated for my work in this matter at my standard hourly rate for expert consulting services. My compensation in no way depends on the outcome of this proceeding.

II. INFORMATION AND MATERIALS CONSIDERED

3. I have been asked to provide expert opinions relating to the validity of the Challenged Claim of the D’842 Patent. In conducting the analyses and forming the opinions set forth in this Declaration, I have reviewed and considered the D’842 Patent’s claim, specification, and file history, as well as numerous prior art references and other documents. I have reviewed and considered at least the following materials in preparing this Declaration:

- The D’842 Patent, including its claim, specification, and file history;

- Masimo’s IPR petition regarding the Challenged Claim of the D’842 Patent;
- The references relied upon herein, including but not limited to Paulke, Yuen, Fong, Bushnell, Mendelson;
- The complaint from the parties’ parallel design patent litigation in Delaware District Court (Exhibit 1005);
- The Declaration of R. James Duckworth, Ph.D. (Exhibit 1014);
- Apple’s public opening post-hearing brief from the parties’ parallel ITC Investigation (Exhibit 1017);
- The public hearing transcript from the parties’ parallel ITC Investigation (Exhibit 1021);
- The redacted opening expert report of Steve Warren, Ph.D. from the parties’ parallel litigation in California District Court (Exhibit 1026);
- Any materials referenced directly or indirectly in my Declaration; and
- The information and materials identified in the following table:

Exhibit No.	Description
1001	U.S. Patent No. D947,842 (“the D’842 Patent”)
1002	File History of U.S. Patent No. D947,842
1004	<i>Curriculum Vitae</i> of Joel Delman

Exhibit No.	Description
1005	<i>Apple Inc. v. Masimo Corporation, et al.</i> , Complaint, No. 1:22-cv-01377 (D. Del.)
1006	PCT Appl. Pub. No. WO 2017/165532 (“Paulke”)
1007	U.S. Pat. Appl. Pub. No. 2019/0196411 (“Yuen”)
1008	U.S. Pat. No. D827,831 (“Fong”)
1009	U.S. Pat. Appl. Pub. No. 2017/0086743 (“Bushnell”)
1011	U.S. Pat. No. 6,801,799 (“Mendelson”)
1014	Declaration of R. James Duckworth, Ph.D.
1015	<i>Curriculum Vitae</i> of R. James Duckworth, Ph.D.
1016	Scott Jung, “Medgadget Joins the Verily Baseline Project Study, Part 2: The Tech,” archived on October 27, 2017 by the Internet Organization’s “Wayback Machine” at https://web.archive.org/web/20171027221742/https://www.medgadget.com/2017/10/medgadget-joins-verily-baseline-project-study-part-2-tech.html
1017	<i>Masimo Corp. et al. v. Apple Inc.</i> , Apple’s September 14, 2022 Public Second Corrected Post-Hearing Brief, ITC Inv. No 337-TA-1276
1018	“Apple Watch Series 4: Beautifully redesigned with breakthrough communication, fitness and health capabilities,” archived on September 12, 2018 by the Internet Organization’s “Wayback Machine” at https://web.archive.org/web/20180912191250/https://www.apple.com/newsroom/2018/09/redesigned-apple-watch-series-4-revolutionizes-communication-fitness-and-health/
1019	“Your heart rate. What it means, and where on Apple Watch you’ll find it,” archived on January 23, 2019 by the Internet Organization’s “Wayback Machine” at https://web.archive.org/web/20190123031906/https://support.apple.com/en-us/HT204666

Exhibit No.	Description
1020	“Apple Watch Series 4 – Health,” archived on September 20, 2018 by the Internet Organization’s “Wayback Machine” at https://web.archive.org/web/20180920103403/https://www.apple.com/apple-watch-series-4/health/
1021	<i>Masimo Corp. et al. v. Apple Inc.</i> , June 6-10, 2022 Public Hearing Transcript, ITC Inv. No 337-TA-1276
1022	“Charge Apple Watch,” https://support.apple.com/guide/watch/charge-apple-watch-apd2b717523a/watchos (last visited Mar. 6, 2023)
1023	“Apple Watch Magnetic Charging Cable (1 m),” https://www.apple.com/shop/product/MX2E2AM/A/apple-watch-magnetic-charging-cable-1m (last visited Mar. 6, 2023)
1024	U.S. Pat. No. 10,610,157 (“’157 patent”)
1025	U.S. Pat. No. 10,627,783 (“’783 patent”)
1026	<i>Masimo v. Apple</i> , Excerpts of Redacted Sept. 23, 2022 Opening Expert Report of Steve Warren, Ph.D., No. 8:20-cv-48 (CD Cal.)
1027	“Apple Watch Series 4 Teardown,” https://www.ifixit.com/Teardown/Apple+Watch+Series+4+Teardown/113044 (last visited Mar. 6, 2023)
1029	K192415 510(k) Summary for Verily Study Watch, https://www.accessdata.fda.gov/cdrh_docs/pdf19/K192415.pdf (last visited Mar. 6, 2023)
1030	U.S. Pat. No. 10,912,501 (“the ’501 patent”)
1031	Y. Mendelson et al., “Measurement Site and Photodetector Size Considerations in Optimizing Power Consumption of a Wearable Reflectance Pulse Oximeter,” Proceedings of the 25th IEEE Conference (2003)
1032	U.S. Pat. No. D753,510

Exhibit No.	Description
1033	U.S. Pat. No. D782,537
1034	U.S. Pat. No. D735,131 (“the ’131 patent”)
1035	Chinese Design Reg. No. 303285726
1036	Konig et al., <i>Reflectance Pulse Oximetry – Principles and Obstetric Application in the Zurich System</i> , 1998 (“Konig”)
1037	Yitzhak Mendelson, <i>Invasive and Noninvasive Blood Gas Monitoring</i> , 1991 (“Mendelson-1991”)
1038	<i>Masimo Corp. et al. v. Apple Inc.</i> , Public Excerpts of Apple’s June 6, 2022 Opening Presentation, ITC Inv. No 337-TA-1276
1039	U.S. Pat. No. D816,524
1040	<i>Masimo Corp. et al. v. Apple Inc.</i> , Public Excerpts of Final Initial Determination on Violation of Section 337, ITC Inv. No 337-TA-1276
1041	U.S. Pat. No. 10,912,502 (“the ’502 patent”)
1042	U.S. Pat. No. 10,945,648 (“the ’648 patent”)
1043	N. Meziane et al., Dry Electrodes for Cardiography, <i>Physiological Measurement</i> 34 (2013) (“Meziane”)
1044	U.S. Pat. No. 6,265,789 (“Honda”)
1045	<i>Apple Inc. v. Masimo Corporation, et al.</i> , Masimo’s (Public) Opposition to Apple’s Motion for an Expedited Trial, No. 1:22-cv-01377 (D. Del.)
1046	<i>Apple Inc. v. Masimo Corporation, et al.</i> , Public Excerpt of January 30, 2023 Declaration of James Malackowski in Support of Apple Inc.’s Motion for an Expedited Trial, No. 1:22-cv-01377 (D. Del.)

4. In preparing this Declaration, I have considered my own knowledge and experience, including my work in the field of industrial design and product development; my experience working with others involved in the field; and the materials identified herein. I understand my analyses and opinions, including my review of any materials cited herein, should be made from the perspective of a designer of ordinary skill in the art related to the D'842 Patent at the relevant time (i.e., a "DOSA"). I understand the relevant time is June 27, 2018. Accordingly, my analyses and opinions are made from that relevant perspective. My testimony herein refers to the knowledge of a DOSA as of June 27, 2018, unless indicated otherwise.

5. Any figures appearing in this Declaration were prepared with the assistance of counsel and reflect my understanding of the D'842 Patent and the materials discussed herein. Coloring and colored annotations to figures in my Declaration have been added unless I have indicated otherwise.

III. EXPERIENCE AND QUALIFICATIONS

6. I have been an industrial designer, design strategist, and inventor for more than 28 years. I have a Master of Industrial Design from Pratt Institute in New York.

7. Starting in 1999, I began working with the design consultancy Product Development Technologies LLC ("PDT"). I served as PDT's Los Angeles Creative Director from 2007 until PDT was acquired at the end of 2018.

8. Since PDT's acquisition, I have continued my design practice through my consultancy, Informed Innovation Inc. My work encompasses a broad range of activities related to industrial and product design and development, including strategic user research (e.g., guiding clients toward optimal design solutions), aesthetic and functional innovation, and high-level program management. I also provide expert witness and litigation support services in matters related to patent and trade dress litigation.

9. I also currently serve as Chair of the Industrial Designer's Society of America's (IDSA) Design Protection Committee, and as an Associate Professor at ArtCenter College of Design in Pasadena, California.

10. Prior to joining PDT, from 1993 to 1995, I worked as a staff designer at the New York-based design consultancies Henry Dreyfuss Associates and Cousins Design. I then moved to Chicago, where I worked as a Senior Designer with Zenith Electronics Corporation from 1995 to 1997. From 1997 until joining PDT in 1999, I was the Design Director for TwentyTwentyThinking Incorporated.

11. Throughout my 28 year career in industrial design and product development, I have been engaged to assist clients with a wide variety of design challenges, including numerous programs focused on the design of portable consumer electronics, medical devices, and wearables. My clients for such industrial design work have included Motorola, Nokia, Blackberry/RIM, LG Electronics,

Qualcomm, Dell, L3Harris, General Dynamics, Baxter, Novartis, Roche, Carefusion, Cardinal Health, Cynvenio Bio, and Medtronic, among others, for whom I have designed everything from handheld and tablet computers, home use diagnostic devices, cell phones, ruggedized communications, tools relied upon by surgeons for lifesaving procedures, and more. Overall, I have been thoroughly involved in the design of portable electronic devices for approximately 24 years, and a significant focus of my industrial design work since 1999 has been portable consumer and other (e.g., military and industrial) electronic devices.

12. On a personal level, I have been an avid watch collector for at least the past twenty years. My collection, currently comprising over 70 pieces, includes watches dating from the 60's through the present day, with a range of unique digital, jump hour, and electronic timepieces, as well as examples of more traditional mechanical designs. My collection has been carefully curated with an eye for exceptionally well-designed and unique watches, with many featuring transparent “exhibition” case backs to allow for appreciation of their complex and beautiful mechanisms.

13. For the above projects (and all design programs on which I have been engaged), I gained a comprehensive understanding of the intended users for each product I design, how they will use the product, and how my designs will be compared to other designs that consumers evaluate in their purchasing decisions.

14. I have been named as inventor on over 40 U.S. utility and design patents and patent publications. The complete list of these patents and patent publications is included with my curriculum vitae, which is attached as Exhibit 1004.

15. My design work has received awards and recognition from the Industrial Designers Society of America (which awards include, among others, the “IDSA 20/20 Award” recognizing twenty designers who contributed to the advancement of the design profession in 2020), the Chicago Athenaeum, the Consumer Electronics Association, the Toy Industry Association, ID Magazine, and the Wall Street Journal, and has been featured in books aimed at educating design students about the industrial design profession.

16. In addition to my work in product design consulting, I have frequently offered my expertise as a mentor and advisor to technology and hardware-focused start-up companies through Los Angeles-based incubator and accelerator programs, and served as a member of the Board of Directors for the medical device manufacturer MetaMason Inc. for five years.

17. Given the range of professional and personal experience described above, I am well-qualified to opine on the matters covered in this declaration, including how a designer of ordinary skill in the art in June 2018 would perceive the overall visual impression of the design claimed in the D’842 Patent and designs

disclosed in the pertinent prior art, and to testify as a designer of ordinary skill in the art with respect to the D'842 Patent and prior art in this proceeding.

18. During the previous five years, I have served as expert witness in over twenty cases related to design patents and trade dress, and I have testified by deposition and/or at trial in fourteen cases. A complete list of the matters in which I have testified in the previous five years is included with my curriculum vitae (Exhibit 1004).

19. During the previous 10 years, I have authored approximately 26 articles and publications. A complete list of my articles and publications is included with my curriculum vitae (Exhibit 1004).

20. Prior to entering the profession of industrial design, I graduated from Harvard Law School and practiced corporate and securities law. I have not practiced law or been barred as an attorney for the last 27 years. I am an industrial designer, not an expert in patent law, and therefore I have been advised of certain principles of patent law applicable in this matter, which I applied in forming the opinions set forth in this Declaration.

21. Above, I have provided a concise summary of my experience and qualifications that I believe is most relevant to the analyses and opinions I have expressed in this Declaration. A copy of my curriculum vitae, which describes in

further detail my qualifications, responsibilities, employment history, honors, awards, professional associations, and more, is included as Exhibit 1004.

IV. SUMMARY OF OPINIONS

22. I have conducted analyses leading to the opinions expressed in this Declaration. To summarize those opinions, it is my conclusion, from the perspective of a designer of ordinary skill in the relevant art at the time of the D'842 Patent in June 2018, that the Challenged Claim of the D'842 Patent would have been obvious to a designer of ordinary skill in the art based on the grounds identified herein (i.e., Grounds 1-3 in Masimo's IPR petition). Specifically, it is my opinion that:

- (Ground 1) Paulke is an appropriate primary reference, Mendelson is an appropriate secondary reference to combine with Paulke, and the Challenged Claim of the D'842 Patent would have been obvious to a designer of ordinary skill in the art based on Paulke and Mendelson;
- (Ground 2) Yuen is an appropriate primary reference, Mendelson and Bushnell are appropriate secondary references to combine with Yuen, and the Challenged Claim of the D'842 Patent would have been obvious to a designer of ordinary skill in the art based on Yuen, Mendelson, and Bushnell; and
- (Ground 3) Fong is an appropriate primary reference, Mendelson and Bushnell are appropriate secondary references to combine with Fong, and

the Challenged Claim of the D’842 Patent would have been obvious to a designer of ordinary skill in the art based on Fong, Mendelson, and Bushnell.

23. Below, I provide the complete analyses supporting my opinions.

V. THE D’842 PATENT

A. Overview of the D’842 Patent

24. The D’842 Patent is titled “Electronic Device” and includes Figures 1-9. Exhibit 1001. The D’842 Patent claims “[t]he ornamental design for an electronic device, as shown and described” in its figures. *Id.*, claim. As shown in the following table, the D’842 Patent claims the design of two arc-shaped portions (colored gray for clarity) surrounding a circular array of rectangles (colored blue for clarity).

D'842 Patent Figures and Descriptions

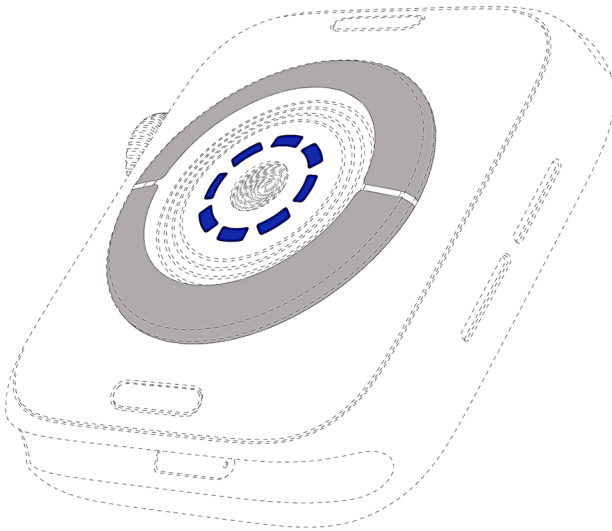


FIG. 2

“FIG. 2 is a bottom rear perspective view [of an electronic device showing the claimed design].”

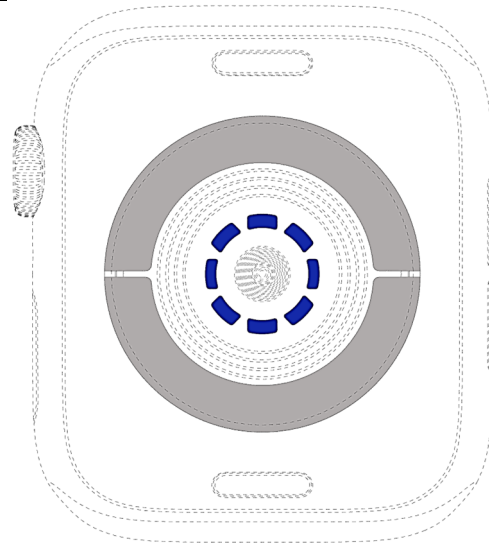


FIG. 4

“FIG. 4 is a rear view thereof.”

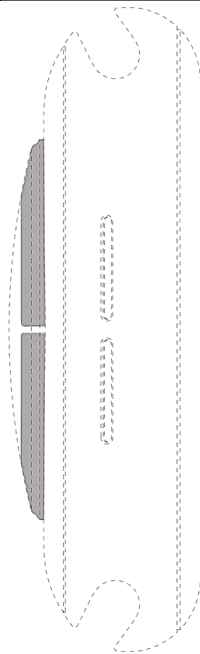


FIG. 5

“FIG. 5 is a left side view thereof.”

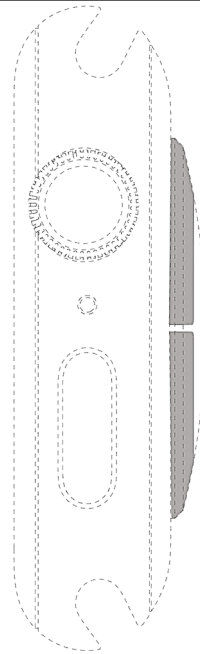
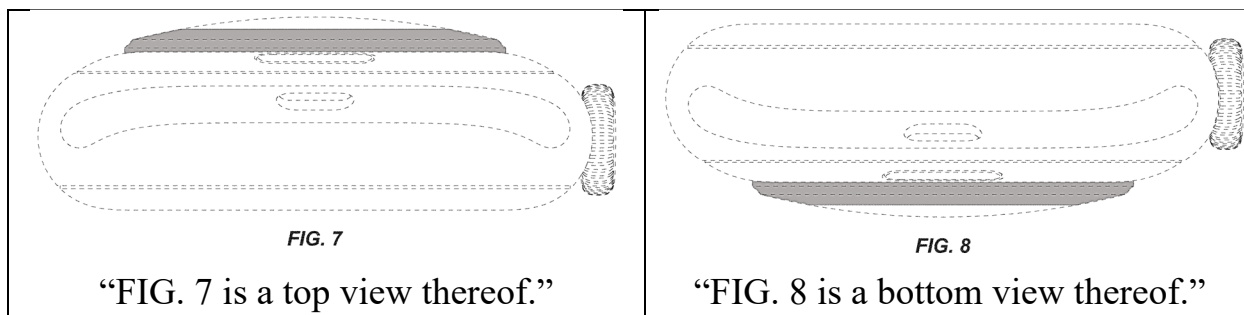


FIG. 6

“FIG. 6 is a right side view thereof.”



Everything depicted in the D’842 Patent’s “front” views of the electronic device, which are Figures 1, 3, and 9, is drawn in broken lines. *Id.*, FIGS. 1, 3, 9. Thus, I have not included those figures above simply because nothing on the front of the device is claimed. *Id.*, Description (“The broken lines in the figures ... form no part of the claimed design.”).

B. Prosecution History of the D’842 Patent

25. The D’842 Patent issued from U.S. Patent Application No. 29/816/024 (the “’024 Application”), which was filed on November 18, 2021. Exhibit 1001, cover. The ’024 Application included Figures 1-135—well over one hundred figures. Exhibit 1002, 13-118. The Applicant (Apple) filed a preliminary amendment to the ’024 Application on December 14, 2021 to “replace Figures 1-135 with replacement Figures 1-9.” *Id.*, 324-326. On February 2, 2022, the ’024 Application was allowed without any rejections. *Id.*, 347. Further, on April 5, 2022, the ’024 Application issued as the D’842 Patent. Exhibit 1001, cover.

VI. LEVEL OF ORDINARY SKILL IN THE RELEVANT ART

26. I understand that the D’842 Patent was purportedly filed on June 27, 2018. The D’842 Patent claims the design of an “electronic device,” specifically the design of aspects of the sensors of Apple Watch Series 4, as explained below in Section VIII. As of June 2018, a designer of ordinary skill in the art related to the D’842 Patent (a “DOSA”) would have had an undergraduate or graduate degree in industrial and/or product design, along with at least two years of relevant work experience in the field of industrial and/or product design of portable electronic devices.

27. A DOSA would not have to be familiar with the electrical, biomedical, physics, or other advanced technical concepts employed by or involved in the portable electronic device being designed by the DOSA. Instead, a DOSA would have consulted or collaborated with a person of ordinary skill in the art related to the D’842 Patent (a “POSITA”) regarding technical concepts outside of the DOSA’s areas of expertise. As an industrial designer, I have always worked closely with engineers (including mechanical, electrical, and software engineers) in a synergetic way. When designing products for mass production, it is critical that designers collaborate with engineers from the earliest stages of a project to ensure the proper functionality and manufacturability of a device within the aesthetic parameters defined by the industrial design team. I understand that R. James Duckworth, Ph.D.

qualifies as a POSITA and is submitting a declaration (Exhibit 1014) in connection with this matter. Accordingly, I have relied on Dr. Duckworth's technical discussions, analyses, and opinions regarding technical concepts outside of my areas of expertise to support the discussions, analyses, and opinions set forth herein in my Declaration.

28. Through my decades of experience as an industrial designer, I understand the knowledge, experience, skill, and creativity of a DOSA in June 2018 very well and am qualified to provide the discussions, analyses, and opinions I have presented in this Declaration, which are from the perspective of a DOSA as of that relevant time.

VII. APPLICABLE LEGAL STANDARDS

29. I am an industrial designer by training and profession. The opinions I express in this Declaration involve the application of my knowledge and experience to the evaluation of the D'842 Patent and certain prior art to the D'842 Patent.

30. Although I have been involved as an industrial design expert in patent matters before, I am not an expert in patent law. Therefore, I have been advised of certain principles of patent law applicable in this matter, which I have used in arriving at my determinations and opinions. The paragraphs below express my understanding of the legal requirements I have used in forming my opinions.

A. Claim Construction

31. I understand that in an *inter partes* review, a design claim should be construed in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art in view of the solid lines shown in the patent's figures, the description of those figures, and the prosecution history pertaining to the patent.

32. I understand that, while the preferable course for design patent claim construction is not to provide a detailed verbal description, using verbal or written guidance is beneficial in certain circumstances. I understand that using verbal or written guidance to describe a claimed design is often helpful to point out various features of the claimed design as they relate to the prior art. I understand that a design patent, unlike a utility patent, limits protection to the ornamental design of an article of manufacture. It is my experience that most articles and designs sold into the stream of commerce have some function or purpose. Where a design patent contains functional and ornamental elements, I understand that the scope of the claimed design is limited to the ornamental aspects alone and does not extend to functional elements. I further understand that, where a design contains both functional and non-functional (i.e., ornamental) elements, the scope of the design claim must be construed to identify the non-functional aspects of the claimed design. I understand that using verbal or written guidance to describe a claimed design is

helpful to outline the distinction between ornamental and functional elements of the claimed design. I also understand that a claim to a design with numerous functional elements requires a narrow construction. I further understand that functional aspects may be factored out of the claimed design, and that claim construction and the design obviousness analysis should focus on only the non-functional aspects of the claimed design.

33. While I understand that a particular test has not been mandated for assessing the functionality of a claimed design, I understand that there are numerous factors to be considered in evaluating functionality. First, I understand that the availability of comparable alternative designs is an important if not dispositive factor in evaluating the functionality of a claimed design. I also understand that if other designs would not produce the same or similar functional capabilities, or would not properly function with the claimed design, such other designs are not comparable alternative designs. Second, I understand that there are various other factors useful for assessing claim construction functionality, including: whether the claimed design represents the best design; whether alternative designs would adversely affect the article's utility; whether there are any concomitant utility patents; whether advertising touts particular design features as having specific utility; and whether there are any design elements or an overall appearance clearly not dictated by function. I also understand that where an element of a claimed design has been

specifically designed to fit into, or mate with, some other article, the design element has been deemed functional.

B. Obviousness

34. I understand that a patent is invalid as obvious if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious, before the effective date of the claimed invention, to a person of ordinary skill in the art. I further understand that the obviousness analysis assesses (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) secondary considerations nonobviousness (if present). For design patents, I understand that the ultimate obviousness inquiry asks whether the claimed design would have been obvious to a designer of ordinary skill in the art who designs articles of the type involved in the design patent at issue (a “DOSA”).

35. In a design patent obviousness inquiry, I understand that the first step is to identify a single, “primary” reference with design characteristics that are “basically the same” as the claimed design. I understand that a primary reference need not be identical to the claimed design, and that designs with missing elements or multiple differences from the claimed design have previously been found to be suitable primary references. I understand that once a primary reference is found, secondary references may be used to modify the primary reference to create a design

that has the same overall visual appearance as the claimed design. I understand that secondary references may only be used to modify the primary reference if they are so related to the primary reference that the appearance of certain ornamental features in one would suggest the application of those features to the other. I further understand that when a secondary reference is “so related” to the primary reference, the similarity in appearance among them is enough to motivate a designer of ordinary skill to combine features from one with features from the other. In addition to the relatedness of the prior art and claimed designs, I understand that other reasons could have motivated a designer of ordinary skill in the art to combine the features from a secondary reference with the features of the primary reference. Once the primary and secondary references have been combined, I understand that the design obviousness analysis asks whether the combination design has the same overall visual appearance as the claimed design. I understand that comparing the prior art and claimed designs as a whole is what is important, and that *de minimis* or trivial differences between the claimed and combination designs cannot prevent a finding of obviousness. I also understand that the teachings of the prior art as a whole, not just prior art figures and illustrations, may be considered as part of the obviousness inquiry. I further understand that a determination of obviousness does not require a prior art combination to disclose or suggest a design that is identical to the claimed design.

36. Further, I understand that secondary considerations of nonobviousness should be considered if evidence of such considerations is present, and that such secondary considerations cannot overcome a strong case of obviousness.

37. I understand that an assessment of what a reference discloses or teaches—for purposes of an obviousness analysis—must be conducted from the perspective of one of ordinary skill in the art at the time of the invention. I also understand that something is only “inherent in,” and therefore taught by, the prior art if it necessarily flows from the explicit disclosure of the prior art.

38. Applying these legal standards to the Challenged Claim of the D’842 Patent, it is my opinion that the Challenged Claim would have been obvious based on the grounds identified herein (i.e., Grounds 1-3 in Masimo’s IPR petition).

VIII. CLAIM CONSTRUCTION FOR THE D’842 PATENT

39. As shown in the following colorized images, the D’842 Patent claims the design of two arc-shaped portions (gray) protruding from the back of the electronic device and surrounding, but spaced apart from, a circular arrangement of rectangles.

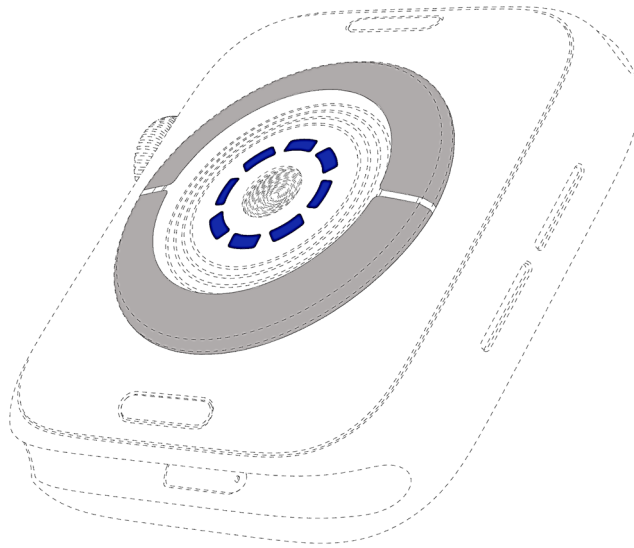


FIG. 2

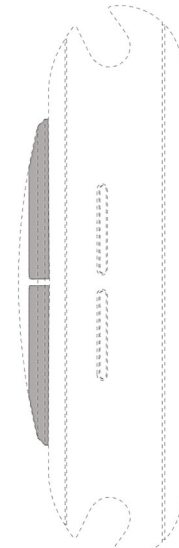


FIG. 5

Exhibit 1001, FIGS. 2, 5. The outermost surface of the claimed arc-shaped portions, shown in cyan below, has a convex curvature (i.e., is a convex surface).

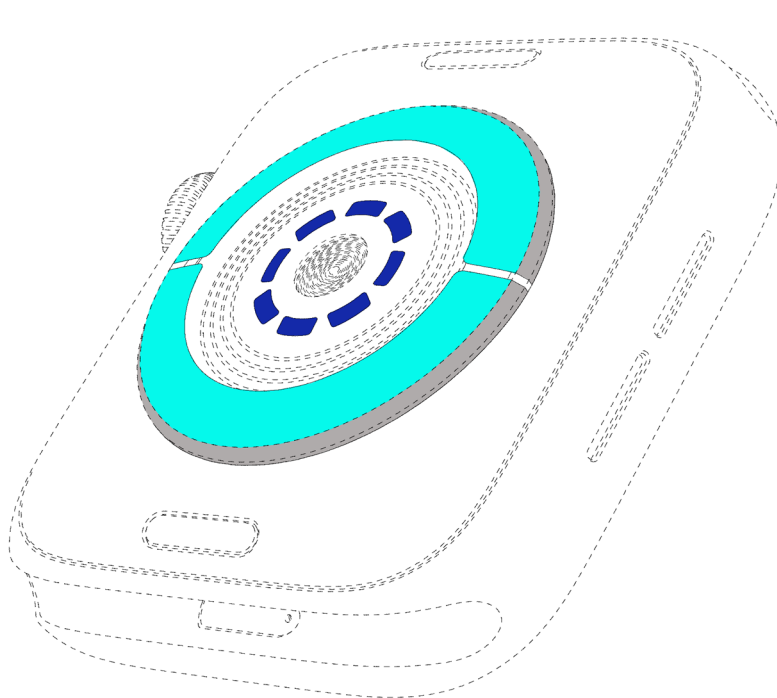


FIG. 2

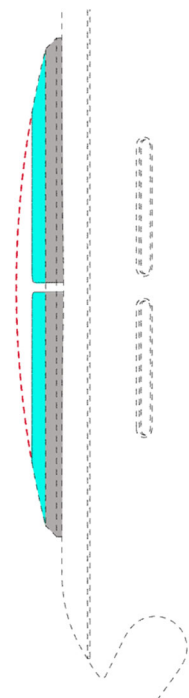
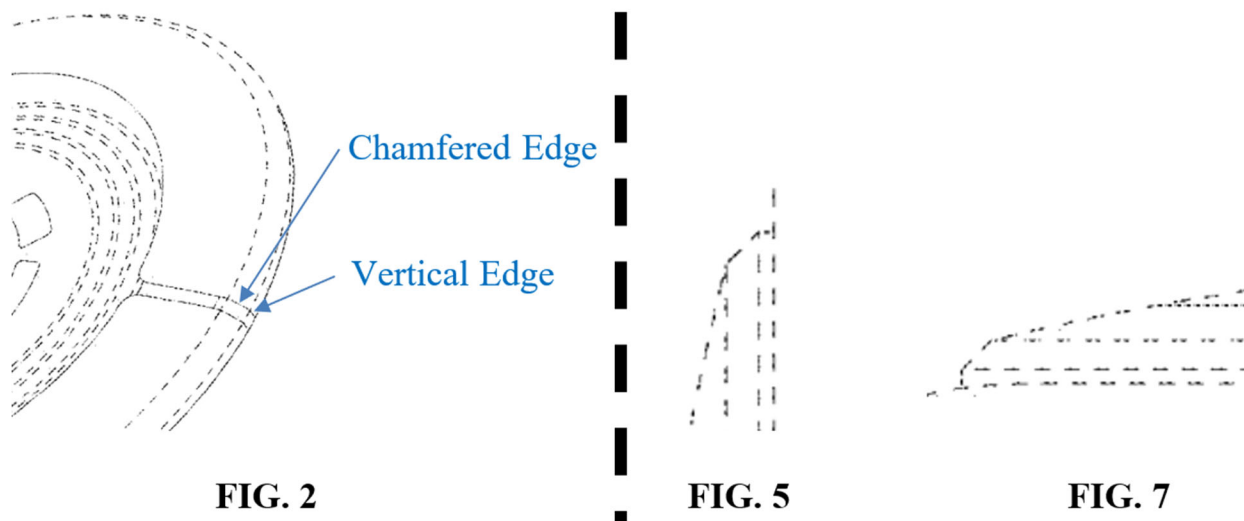


FIG. 5

Exhibit 1001, FIGS. 2 (annotated), 5 (excerpted, annotated). FIG. 5 of the D'842 Patent (above, right) shows that an unclaimed portion of the convex surface (shown

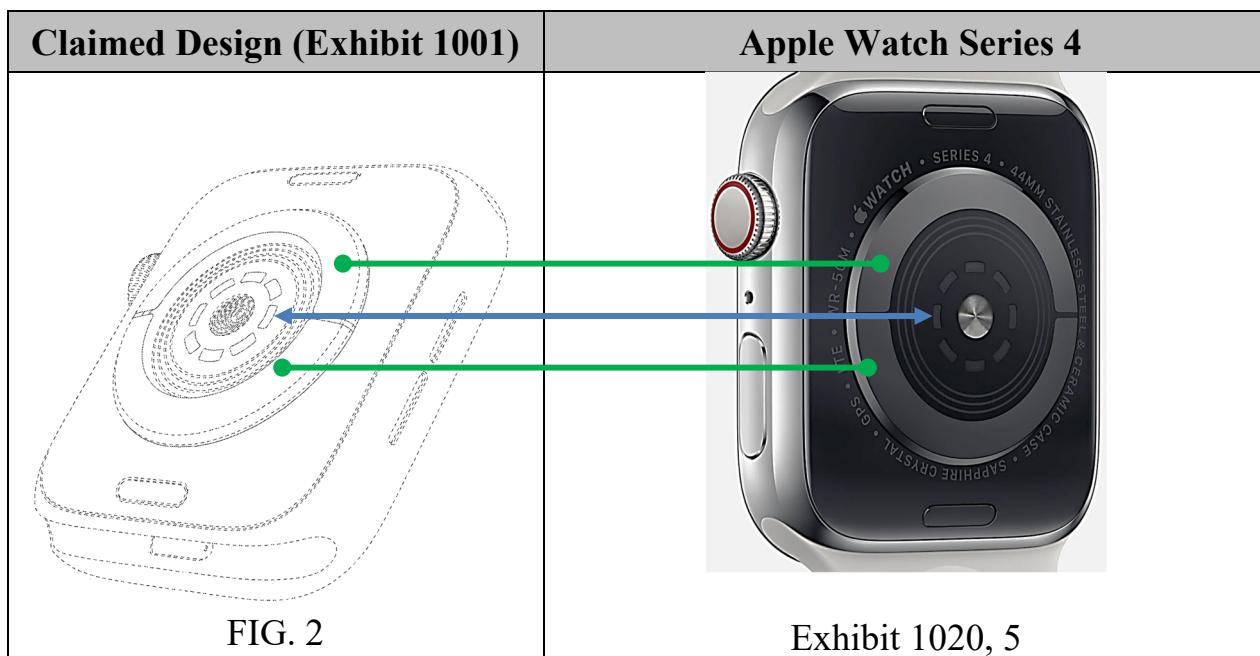
with a red dotted line) continues between the arc-shaped portions. *Id.*, FIG. 5. The claimed (cyan) and unclaimed (red) parts of the convex surface collectively form a convex dome on the back of the device, which covers the claimed rectangles, as shown above. *Id.*, FIGS. 2, 5. Further, as shown above, the claimed rectangles (blue) are included below the convex curved surface of the arc-shaped portions, on an interior surface of the device. *Id.*

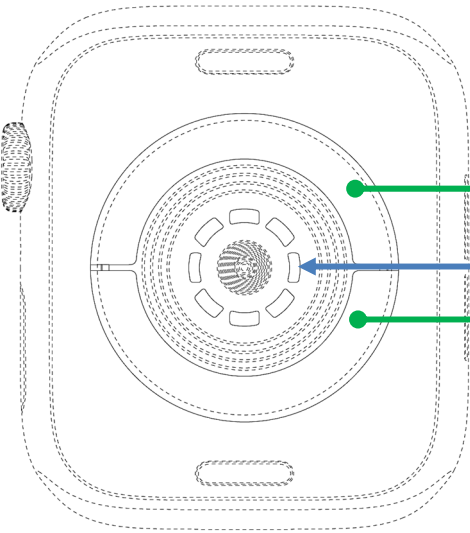
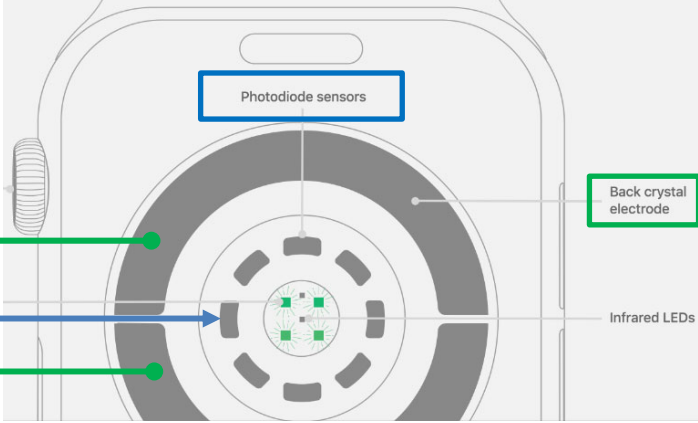
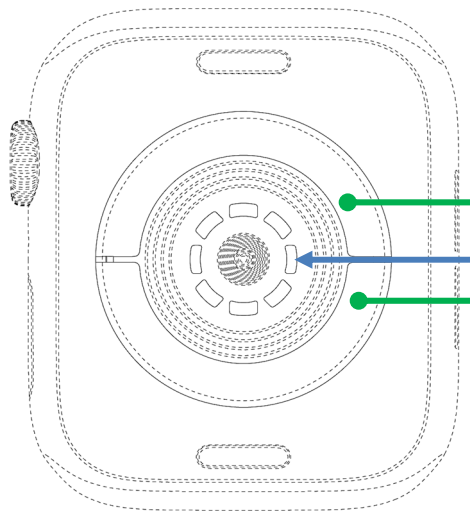
40. As shown below (left), FIG. 2 of the D’842 Patent depicts a sidewall with a vertical edge and a chamfered edge between the convex curvature of each arc-shaped portion and the back of the device. *Id.*, FIG. 2. However, as shown below (right, FIGS. 5 and 7), the sidewall of each arc-shaped portion is drawn with broken lines and, therefore, the sidewalls are not claimed because the D’842 Patent expressly states that “[t]he broken lines in the figures ... form no part of the claimed design.”



Id., FIGS. 2, 5, 7 (all excerpted), Description; *see also id.*, FIGS. 6, 8. Further, I note that even the arc-shaped portions' convex surface (shown in cyan earlier in this section) is drawn with broken lines in FIGS. 5-8 of the patent. *Id.*, FIGS. 5-8.

41. The D'842 Patent was purportedly filed on June 27, 2018. Exhibit 1001, 2. Apple released the Apple Watch Series 4 shortly thereafter, in September 2018. Exhibit 1018. The arc-shaped portions and circular arrangement of rectangles claimed in the D'842 Patent depict components of Apple Watch Series 4's sensors. Specifically, as shown in the below comparison, the D'842 Patent claims the arc-shaped electrodes (green) and circular arrangement of rectangular photodiodes (blue) of the sensors of Apple Watch Series 4.



Claimed Design (Exhibit 1001)	Apple Watch Series 4
 FIG. 4	 Exhibit 1019, 3
 FIG. 4	 Exhibit 1005, 2

The above comparison shows that the arc-shaped portions claimed by the D’842 Patent depict the “built-in electrode[s]” on the back of Apple Watch Series 4. Exhibit 1019, 3; Exhibit 1020, 5. The comparison also shows that the claimed circular arrangement of rectangles depicts the photodiodes that are inside the Watch,

which are part of its “optical heart sensor.” Exhibit 1019, 2-3; Exhibit 1020, 5. Thus, Apple Watch Series 4 is the article underlying the claimed design.

42. I understand that the function of the Apple Watch Series 4’s arc-shaped electrodes is to measure electrical impulses across the user’s chest. Exhibit 1019, 3; Exhibit 1014 ¶44. I also understand that the circular array of rectangular photodiodes inside Apple Watch Series 4 are part of the Watch’s optical sensor, which is a type of sensor known as a photoplethysmography or “PPG” sensor, and that the function of those photodiodes is to receive light that is used to calculate measurements of health parameters like the user’s heart rate. *Id.*

A. The Claimed Design Includes Numerous Functional Elements

43. As explained above in Section VI, a DOSA would have consulted or collaborated with a POSITA regarding technical concepts outside of the DOSA’s areas of expertise. Assessing whether elements of the claimed design are functional encompasses a variety of such technical concepts. Therefore, in my Declaration, I have relied on Dr. Duckworth’s technical discussions, analyses, and opinions regarding the functionality of the claimed design.

1. The Convex Curvature of the Claimed Arc-Shaped Portions Is Functional

44. I understand that Dr. Duckworth opined that the convex curvature of the arc-shaped portions claimed by the D’842 Patent is a functional element because: (1) the convex curvature of the claimed arc-shaped portions was required for the

back of the underlying article (Apple Watch Series 4) to perform its intended functions of mating snugly with the corresponding shape of the established Apple Watch charger design and aligning with that charger for efficient wireless charging; (2) an alternative design to the convex curvature of the claimed arc-shaped portions was unavailable because using a different curvature for the arc-shaped portions would result in the Apple Watch Series 4 not mating snugly or properly aligning with the concave curvature of the established Apple Watch charger design (i.e., the sole charger design that is used for every Apple Watch model); (3) the convex curvature of the claimed arc-shaped portions is the best or most useful design because only that curvature allows the underlying Apple Watch Series 4 to mate snugly and properly align with the complementary concave shape of the pre-existing Apple Watch charger design; (4) using a design other than the convex curvature of the claimed arc-shaped portions would negatively impact the utility of Apple Watch Series 4 by impeding or eliminating the Watch's ability to mate snugly or properly align with, and thus be recharged by, the pre-existing Apple Watch charger design; (5) Apple's website presents the convex curvature claimed by the D'842 Patent as being useful for the Watch to mate with the concave end of its charger and ensure proper alignment with that charger; (6) two utility patents from Apple, Paulke, Yuen, and two Masimo utility patents infringed by Apple Watch (i.e., at least six utility patent filings) show that the convex curvature of the claimed arc-shaped portions is

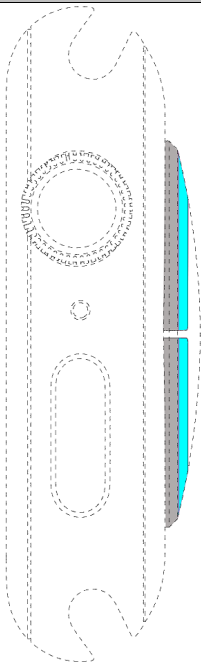
functional; and (7) Apple's technical expert, Dr. Warren, conceded that convex protruding features, like the arc-shaped portions claimed by the D'842 Patent, are used for at least six functional reasons. Exhibit 1014 §VIII.A.

45. While I am not a POSITA and offer no opinions from the perspective of a POSITA, my industrial design experience makes me qualified to address standard industrial design issues such as connections between components (e.g., whether an alternative design for the convex curvature of the claimed arc-shaped portions would mate snugly with the existing concave curvature of the charger design used with every Apple Watch). The claimed convex curvature is the precise complementary shape to the concave curvature of Apple Watch's charger, such that the back of every Apple Watch mates perfectly with the Apple Watch charger, as shown in the example below.



Exhibit 1005, 7; Exhibit 1022, 1-3 (showing that every Apple Watch uses the charger design shown above); *see also* Exhibit 1021, 47:20-24 (explaining intended charger mating and alignment functions of convex curvature on back of every Apple Watch), 959:14-960:2 (same). Therefore, I agree with Dr. Duckworth that a comparable alternative design for the convex curvature of the claimed arc-shaped portions does not exist because using a different curvature for the arc-shaped portions would either (A) make the back of the Apple Watch Series 4 geometrically incompatible with the established concave curvature of its charger, or (B) make Apple Watch Series 4 mate less snugly or securely with its charger because of a smaller area of contact (e.g., less mechanical interlock) between the back of the Watch and the charger.

46. Further, by marketing that “the concave end of the charging cable ... aligns [Apple Watch] properly” with its charger, Apple markets the utility of the convex curvature on the back of the Watch that allows this proper Watch-charger connection. Exhibit 1022, 1-3. As shown below, the convex curvature enabling the marketed Watch-charger connection is the convex curvature used for the arc-shaped portions of the claimed design (colored cyan).

D'842 Patent, FIG. 6	Apple Watch Series 4 (Exhibit 1027)
 FIG. 6	

Therefore, I agree with Dr. Duckworth that Apple's website presents the convex curvature claimed by the D'842 Patent as having a particular utility.

2. The Arrangement of the Claimed Arc-Shaped Portions Is Functional

47. I understand that Dr. Duckworth opined that the arrangement of the arc-shaped portions claimed by the D'842 Patent is a functional element because: (1) Apple's utility patents teach that the claimed arrangement of arc-shaped portions is dictated by the functions of maximizing the area of electrical contact between the arc-shaped electrodes and the skin while avoiding interference between the electrodes and the Watch's charging coil and/or optical sensor; (2) the claimed shapes (arcs) are the best and most efficient shapes for the Watch's electrodes

because using a different shape (not an arc) would either reduce the area of electrical contact between the electrodes and the skin or increase the area of electrical contact by risking interference between the electrodes and the device's charging coil and/or optical sensor; (3) Apple keeping the claimed arrangement of arc-shaped electrodes in five consecutive generations of Apple Watch (comprising six different Apple Watch models: Apple Watch Series 4, 5, 6, 7, 8, and Ultra) indicates the claimed arrangement is the most useful arrangement for measuring electrical impulses through the skin; (4) an alternative design for the arc-shaped electrodes would cover less of the outer periphery of the Watch's convex curvature and therefore increase the risk that the Watch could not measure electrical impulses because one or both of the Watch's electrodes failed to contact the user's skin when in use; and (5) to the extent the chamfered edge of the arc-shaped portions is claimed by the D'842 Patent, that chamfered edge is primarily functional for improving user comfort, as admitted by Apple's expert. Exhibit 1014 §VIII.B.

48. I understand that, in the Apple Watch Series 4 underlying the claimed design, the central optical sensor (shown in blue below) is generally surrounded by a wireless charging coil (approximated in orange below).

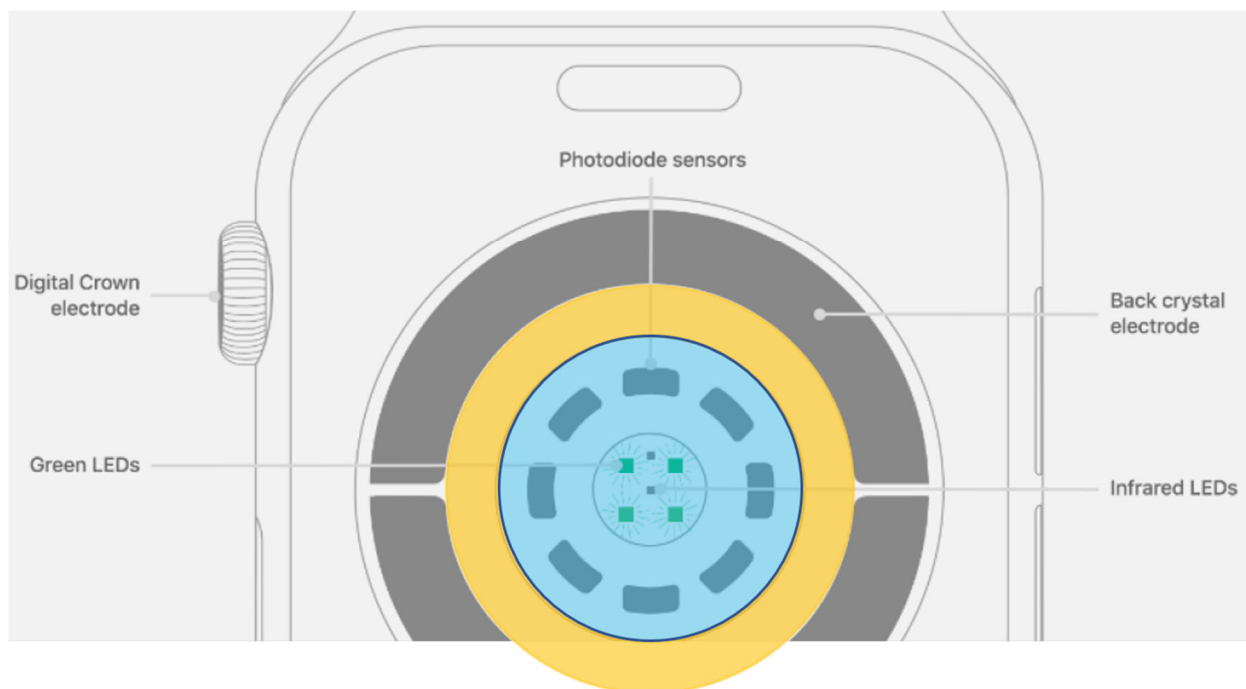


Exhibit 1019, 3 (annotated); Exhibit 1027, 11. Assuming Dr. Duckworth is technically correct that the arc-shaped electrodes of Apple Watch cannot or should not interfere with the Watch's charging coils or optical sensor, I agree with Dr. Duckworth that (A) the Watch's electrodes would have to be placed along the outer periphery of the sensor as claimed in the D'842 Patent and (B) the claimed design of arc-shaped electrodes (colored gray below) with minimal gaps between them, as shown below, is the most efficient shape for maximizing the surface area of the electrodes while avoiding the areas occupied by the Watch's charging coil or optical sensor.

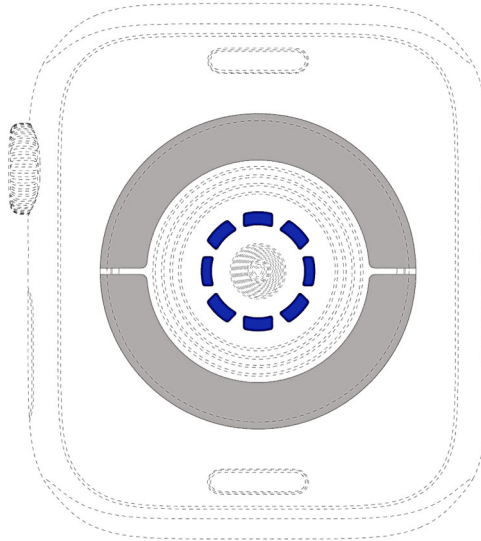


FIG. 4

Exhibit 1001, FIG. 4. Additionally, I know from my industrial design experience that inadequately performing product features are typically either removed or improved in subsequent product generations. Therefore, I agree with Dr. Duckworth that Apple reusing the claimed arrangement of arc-shaped electrodes in five consecutive generations of Apple Watch (six different Apple Watch models) indicates that the claimed design is the most useful design for this functional feature. Exhibit 1022 (showing claimed arrangement of arc-shaped electrodes in Apple Watch Series 4, 5, 6, 7, 8, and Ultra).

3. The Arrangement of the Claimed Rectangles Is Functional

49. I understand that Dr. Duckworth opined that the arrangement of rectangles claimed by the D'842 Patent is a functional element because: (1) the prior art shows that radially-symmetric (i.e., circular) arrays of rectangular photodiodes, like the design claimed by the D'842 Patent, serve the primarily functional purpose

of maximizing the amount of light detected by the PPG sensor; (2) circular arrays of rectangular photodiodes were ubiquitous in the prior art; (3) the number and size of photodiodes are dictated by the function of improving the sensor's accuracy; and (4) the claimed arrangement of rectangular photodiodes is shown and described in Apple's utility patent on the Apple Watch Series 4 sensor design. Exhibit 1014 §VIII.C.

4. The Overall Circular Shape of the Claimed Sensor Is Functional

50. I understand that Dr. Duckworth opined that the overall circular shape of the sensor claimed by the D'842 Patent is a functional element because: (1) overall circular sensors were ubiquitous in the prior art; (2) overall circular sensors are more comfortable for wrist-worn devices; (3) an overall circular sensor was the most efficient sensor shape for housing a circular optical sensor with minimal wasted space; and (4) an overall circular sensor shape allows a sensor of a given width to have the largest usable sensor area that contacts the user's skin. Exhibit 1014 §VIII.D.

51. While I am not a POSITA and offer no opinions from the perspective of a POSITA, my industrial design experience and experience as an avid watch collector makes me qualified to address product comfort considerations. I agree with Dr. Duckworth that an overall circular shape would generally be the most comfortable shape for devices worn on the top of the wrist because circular shapes

lack corners that could cut, abrade, or otherwise needlessly irritate the skin. My industrial design experience also makes me qualified to address product form factor considerations. I agree with Dr. Duckworth that an overall circular sensor shape is the most efficient shape for housing a circular optical sensor with minimal wasted space (i.e., for providing an overall sensor with the smallest form factor). Apple’s own utility patent provides a prime example of this by recognizing the desire for wrist-worn devices to “provide the most functionality in the smallest space” and illustrating such devices with overall circular sensor shapes like the one below.

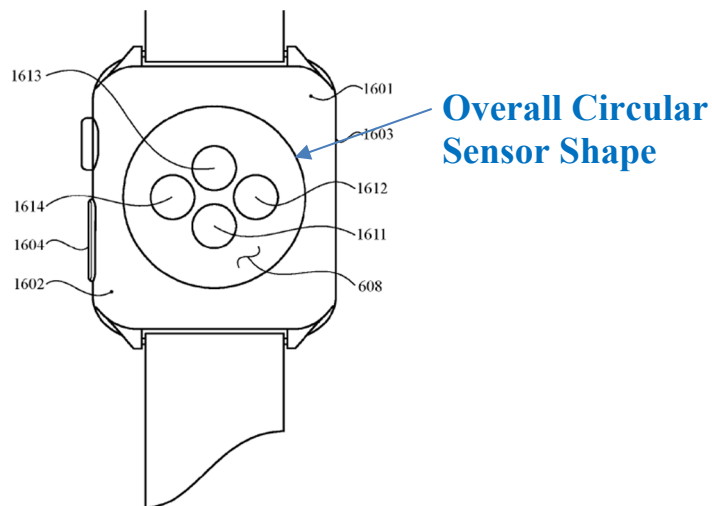


FIG. 16

Exhibit 1025, FIG. 16, 10:16-26; *id.*, 2:46-50 (“The embodiments included herein are directed to a consumer product, which may include a portable or wearable electronic device that is configured to provide an expansive feature set integrated or incorporated into a compact form factor.”), 49:8-10 (recognizing “[t]he space constraints associated with a small wrist-worn device”). Further, the prevalence of

overall circular sensor shapes in prior art wrist-worn devices supports my opinion that an overall circular sensor shape is the most comfortable and efficient design to wear on the wrist. Exhibit 1006, FIGS. 1F-1G; Exhibit 1007, FIGS. 1B, 3-4; Exhibit 1008, FIGS. 2, 4; Exhibit 1009, FIGS. 1-7; Exhibit 1025, FIG. 16.

IX. THE CHALLENGED CLAIM WOULD HAVE BEEN OBVIOUS TO A DESIGNER OF ORDINARY SKILL IN THE ART

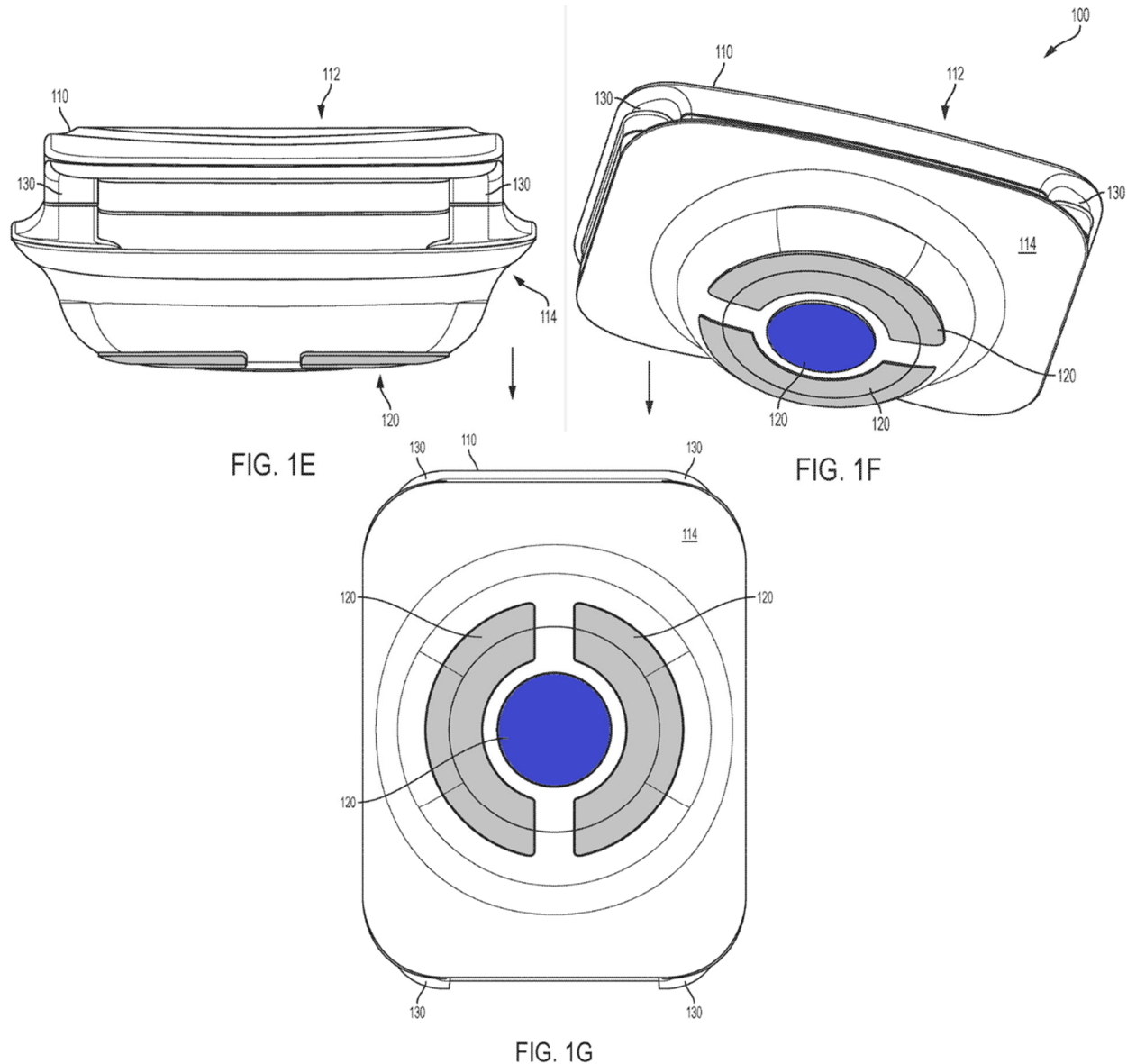
A. Overview of the Prior Art

52. In my opinion, the Challenged Claim would have been obvious to a DOSA over each of the grounds addressed herein and in Masimo's Petition (i.e., Ground 1: Paulke with Mendelson; Ground 2: Yuen with Mendelson and Bushnell; and Ground 3: Fong with Mendelson and Bushnell). Below is a brief summary of each of these prior art references.

1. Paulke (Exhibit 1006 – PCT Appl. Pub. No. WO 2017/165532)

53. Paulke discloses wearable device designs with arc-shaped biosensors, such as electrodes, surrounding a central, circular biosensor (such as a PPG sensor). Specifically, Paulke discloses “designs and techniques for incorporating biosensor devices into a wearable article for making physiological measurements while being worn by a user (e.g., a person).” Exhibit 1006, 5:26-29, Cover. As shown in the following colorized figures, Paulke's arc-shaped biosensors 120 (colored gray) and central, circular biosensor 120 (colored blue) are “protruding from inner surface 114,

in the wrist-facing direction” and have a convex curvature (a surface “curved in the wrist-facing direction”), as shown below.



Id., FIGS. 1E-2A, 14:12-28. Paulke’s arc-shaped biosensors 120 (colored gray in the above figures) are “galvanic skin response (GSR) sensor pads 122, which detect and/or measure electrodermal activity (e.g., skin conductance) of the wearer.” *Id.*, 14:29-32, FIG. 2A. Paulke’s arc-shaped biosensors 120 are, therefore, electrodes.

Id.; Exhibit 1014 ¶72. Paulke teaches that its circular, central biosensor 120 (colored blue in the above figures) may be “a heart rate and/or blood oxygen sensor 124” that can be replaced “with any other suitable biosensor(s),” including “optical reflectance” and “oxygen saturation sensors, etc.” Exhibit 1006, FIG. 2A, 15:6-18. Paulke’s blood oxygen sensor 124 is a PPG sensor. *Id.*; Exhibit 1014 ¶72.

2. Yuen (Exhibit 1007 – U.S. Pat. Appl. Pub. No. 2019/0196411)

54. Yuen discloses wearable device designs with arc-shaped electrodes surrounding a central PPG sensor. Specifically, as shown below, Yuen discloses a “smartwatch assembly 100” with “an electrocardiogram sensor 116” with arc-shaped electrodes 130, 132 (colored gray in the below figures) and “a photoplethysmography [PPG] sensor 118” (colored blue in the below figures).

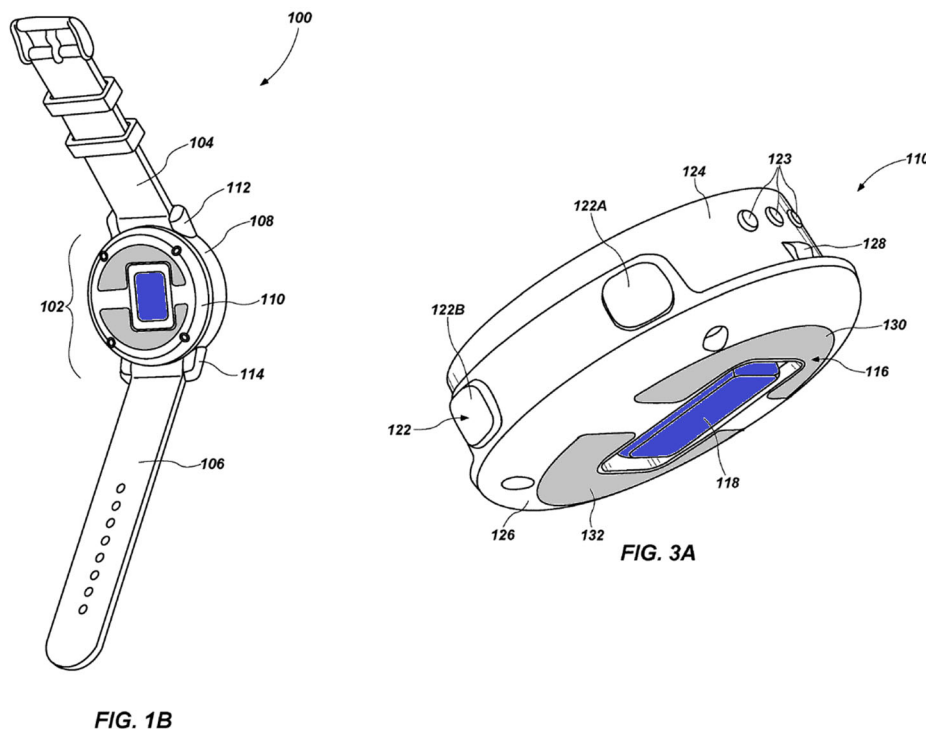


Exhibit 1007 ¶¶32, 35, FIGS. 1B, 3A. Yuen teaches that “the at least two electrodes 130, 132 of the ECG sensor 116 may extend through ... the back cover 126” of the device and “have a general half-moon shape,” as shown in the figures above. *Id.*, FIGS. 1B, 3A, ¶35. Similarly, Yuen teaches that its central PPG sensor 118 (colored blue in the figures above) “extend[s] through the back cover 126 in a location in-between [] the at least two electrodes 130, 132 of the ECG sensor 116.” *Id.*, FIGS. 1B, 3A, ¶42. Additionally, in place of the arc-shaped electrodes 130, 132 of the ECG sensor 116, Yuen teaches its device may use “any [] ECG sensor 116 known in the art.” *Id.* ¶34. Yuen further teaches that, in place of its central PPG sensor 118, Yuen’s device may use “any PPG sensor 118 known in the art.” *Id.* ¶41.

3. Fong (Exhibit 1008 – U.S. Pat. No. D827,831)

55. Fong discloses the design of the “Health Monitoring Wrist Wearable” smartwatch device shown below.

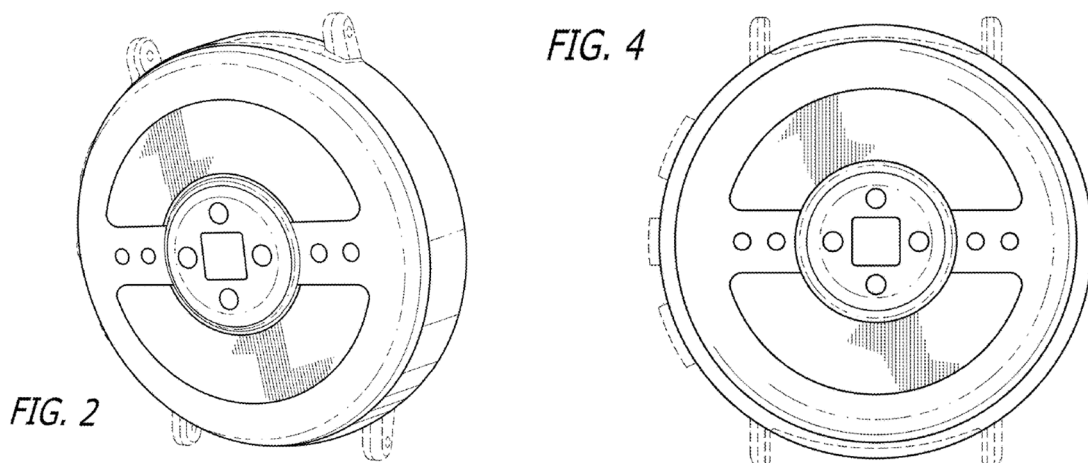
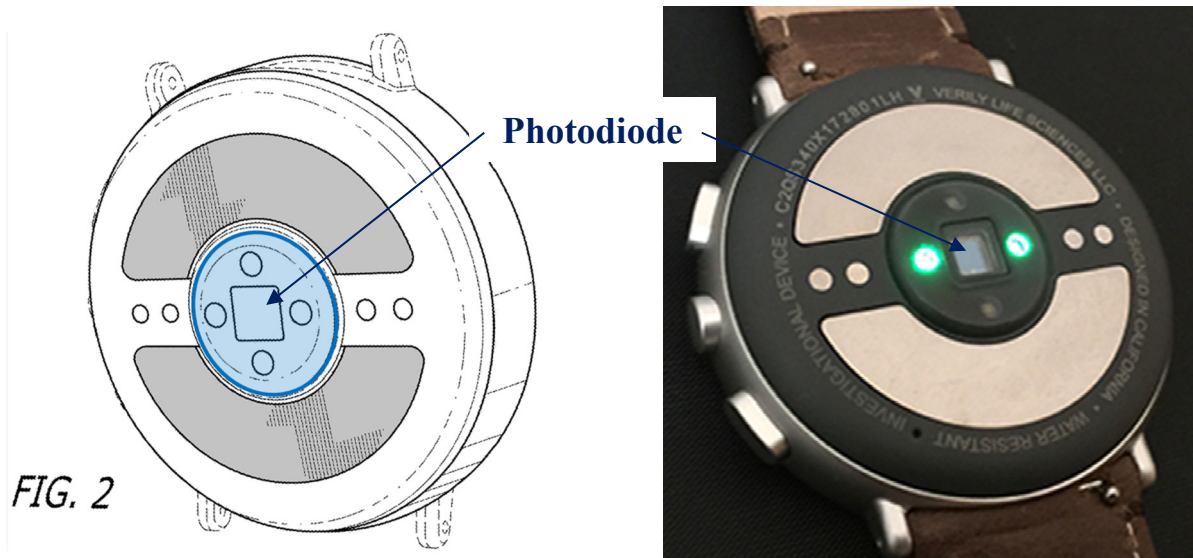


Exhibit 1008, FIGS. 2, 4, Cover. Fong, which identifies “Verily Life Sciences LLC” as its assignee (*id.*, Cover), discloses the design of the Study Watch from Verily Life Sciences, as is demonstrated in the following comparison.



Fong (Exhibit 1008, FIG. 2)

Verily Study Watch (Exhibit 1016, 3)

An article from 2017 about the Study Watch (i.e., Fong’s design) explains that, “[o]n the bottom of the watch are the green LEDs and optical sensor[] that detect the heart rate, [and] metal electrodes that measure electrodermal activity.” Exhibit 1016, 2-3. This article confirms that Fong’s design includes arc-shaped electrodes (colored gray in the above left figure) that surround a central optical sensor (area colored blue in the above left figure). *Id.*; Exhibit 1014 ¶75. I understand that Fong’s “optical sensor” is a PPG sensor that includes the central photodiode as identified in the above figures. Exhibit 1014 ¶75.

4. **Bushnell (Exhibit 1009 – U.S. Pat. Appl. Pub. No. 2017/0086743)**

56. Bushnell is a patent publication from Apple Inc. that discloses a “wearable electronic device,” which looks like an Apple Watch. Exhibit 1009, Cover, FIGS. 1A-1B. Bushnell discloses a device with a housing component 104 that has a convex surface (colored red below) that covers a “health sensor 215” such as “a photoplethysmogram (PPG) sensor” (colored blue below). *Id.*, ¶¶37, 48, FIGS. 1A-2B.

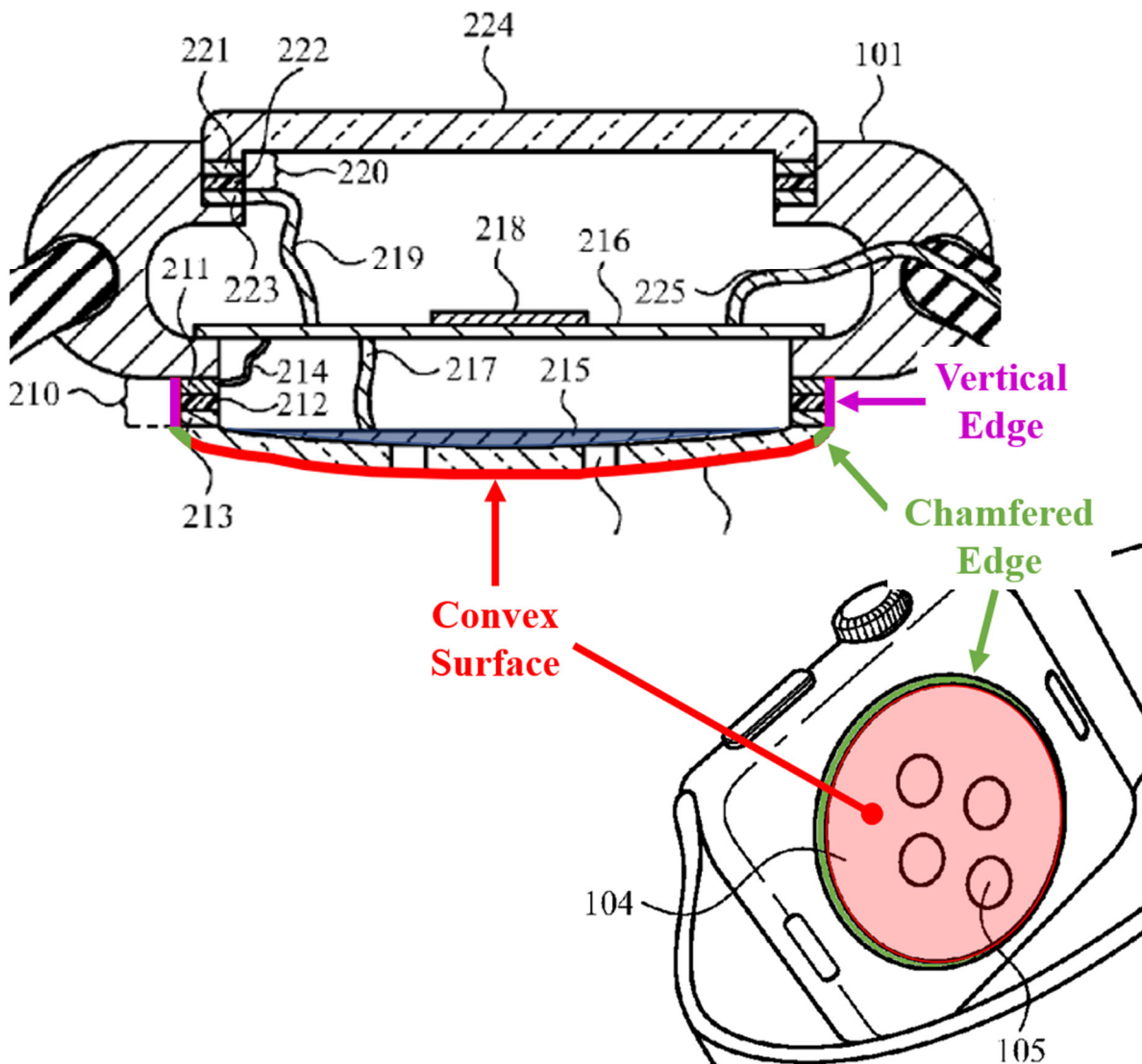


Exhibit 1009, FIGS. 2A (left/top), 1A (right/bottom) (excerpted, annotated). As shown above, Bushnell's housing component 104 has a vertical edge (colored pink in the above figures) and a chamfered edge (colored green in the above figures) between its convex surface (colored red in the above figures) and the back of the device. *Id.*, FIGS. 1A-7. FIGS. 1A-1B of Bushnell include a chamfered edge between the device's body and the convex surface 104, as shown in FIG. 1A (above right). *Id.*, FIGS. 1A-1B. FIGS. 2A-2B of Bushnell show a "cross-sectional view of the wearable electronic device" of FIGS. 1A-1B. *Id.* ¶¶21-24. Therefore, a DOSA would have understood that Bushnell's FIGS. 2A-2B include the same chamfered edge from FIGS. 1A-1B surrounding the convex surface of housing component 104, as shown above (left) with respect to FIG. 2A. Exhibit 1009, FIGS. 1A-2B, ¶¶21-24.

5. Mendelson (Exhibit 1011 – U.S. Pat. No. 6,801,799)

57. Mendelson is titled "Pulse Oximeter and Method of Operation" and discloses pulse oximetry sensors, also known as oxygen saturation or blood oxygen sensors, which I understand are PPG sensors. Exhibit 1011, Cover, 1:15-2:27; Exhibit 1014 ¶77. Mendelson teaches PPG sensor designs with "radially-symmetric" arrays of photodiodes surrounding the central LEDs of the sensor. Exhibit 1011, 4:14-16, 4:59-62, FIG. 7; Exhibit 1014 ¶77. As shown in blue below, Mendelson teaches a sensor design with two, concentric arrays of six rectangular

photodiodes (an inner array 18 and an outer array 16, for a total of 12 photodiodes) that arranged symmetrically around the central LEDs (12A-12C).

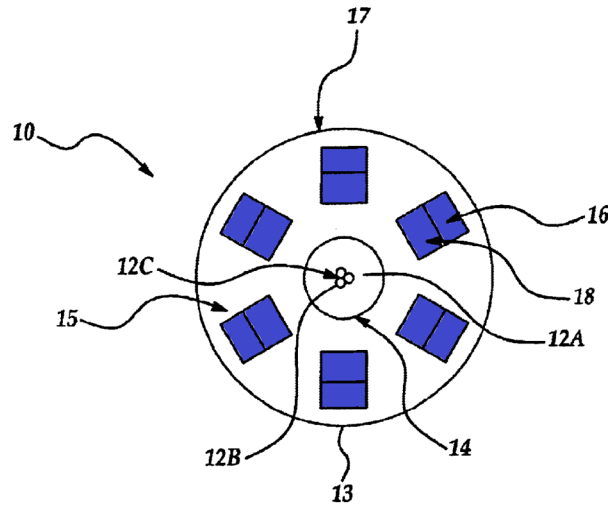


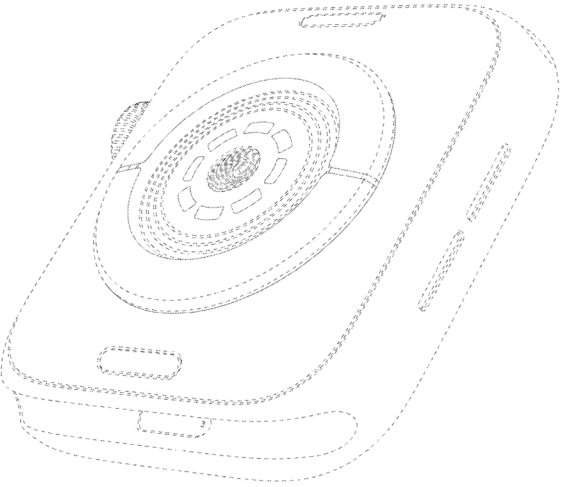
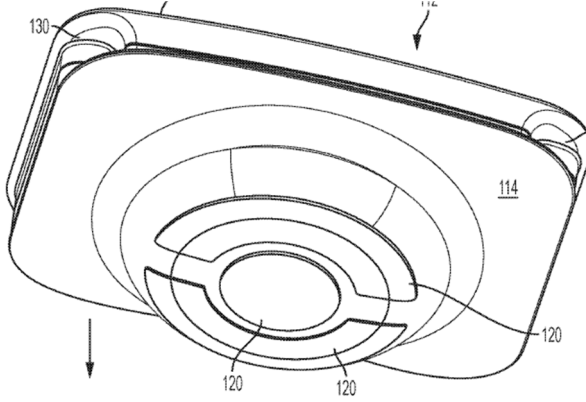
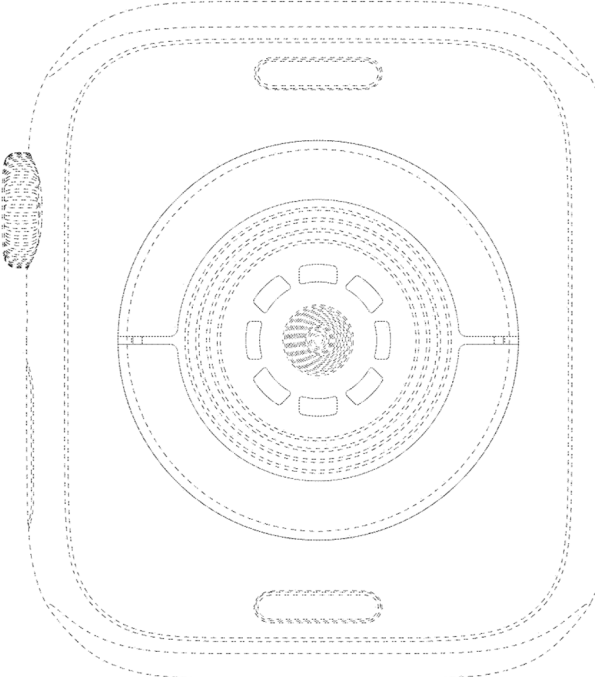
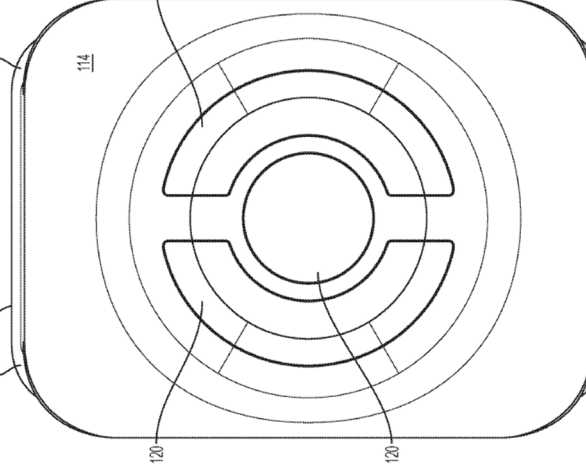
Figure 7

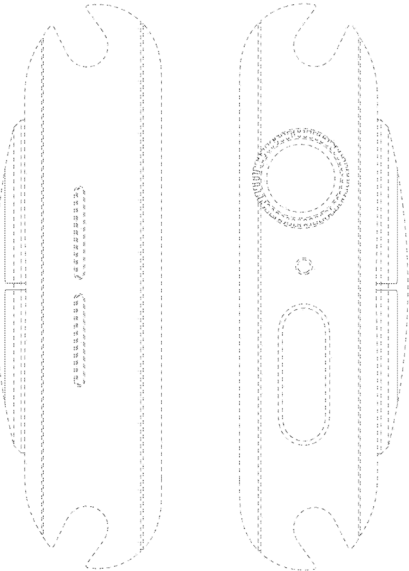
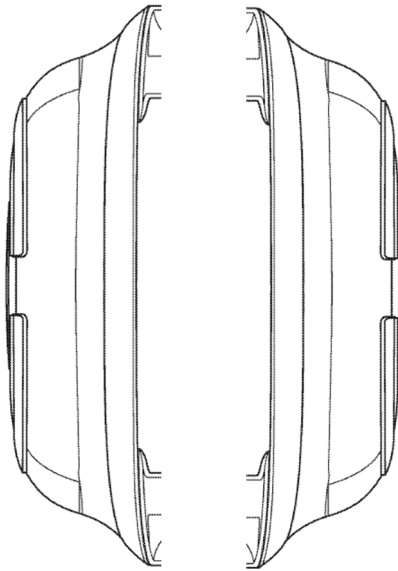
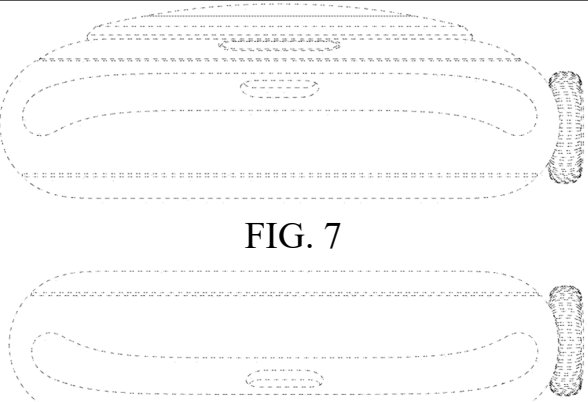
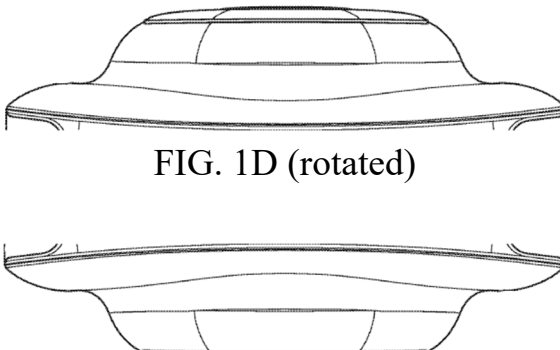
Exhibit 1011, FIG. 7, 9:22-40; Exhibit 1014 ¶77.

B. [Ground 1] The Challenged Claim of the D’842 Patent Would Have Been Obvious Over Paulke Combined With Mendelson

1. Paulke Is A Primary Reference for the D’842 Patent

58. As shown in the comparison below, the design characteristics of Paulke are basically the same as the claimed design:

D'842 Patent	Paulke (Exhibit 1006)
 FIG. 2	 FIG. 1F
 FIG. 4	 FIG. 1G (rotated)

D'842 Patent	Paulke (Exhibit 1006)
 FIG. 5 FIG. 6	 FIG. 1E (rotated)
 FIG. 7 FIG. 8	 FIG. 1D (rotated) FIG. 1D (rotated)

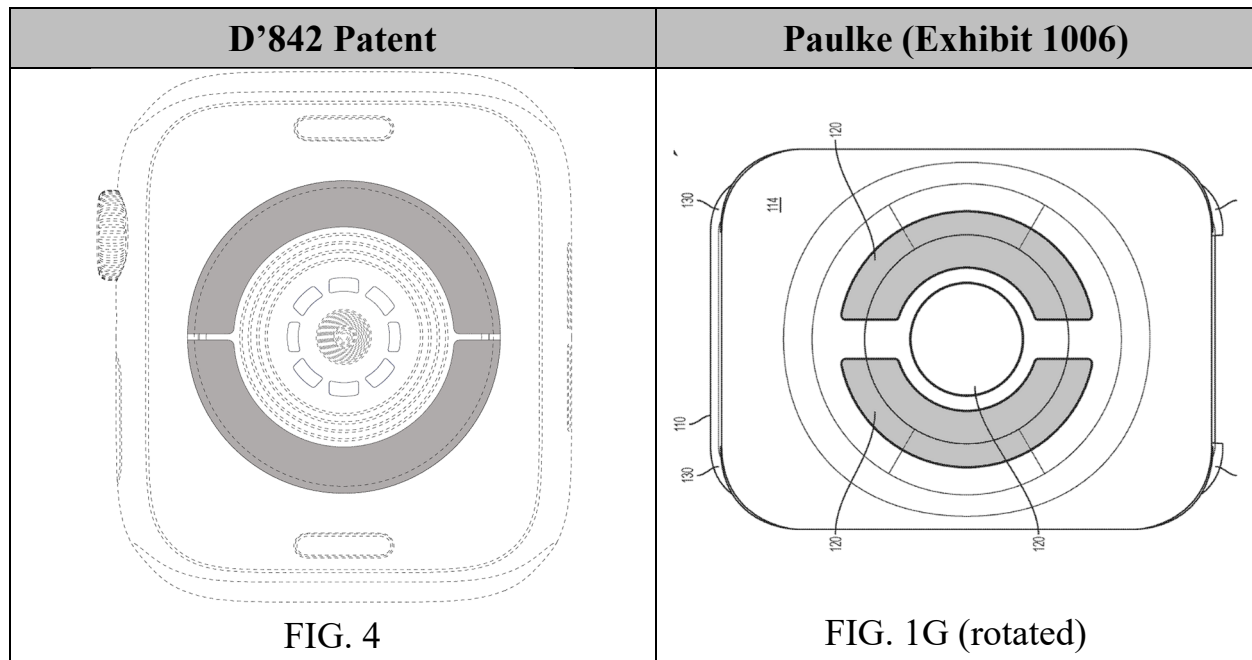
The above comparison demonstrates that Paulke is an appropriate primary reference because its design conveys basically the same overall visual impression as the claimed design. *Compare* Exhibit 1001, FIGS. 2, 4-8 *with* Exhibit 1006, FIGS. 1D-1G. Additionally, the following comparison of the respective design aspects of

Paulke and the claimed design demonstrates the overall visual similarity between these designs.

a. Arc-Shaped Portions

59. As explained above in Section VIII.A.2, the claimed arrangement of the arc-shaped portions is a functional element. Therefore, I understand this aspect should be disregarded in the obviousness analysis.

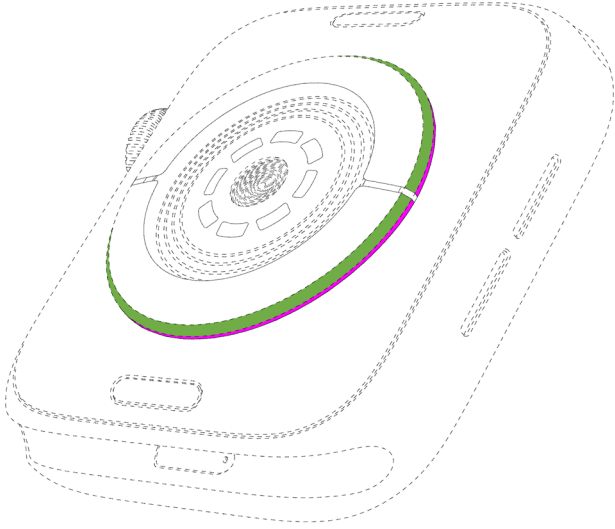
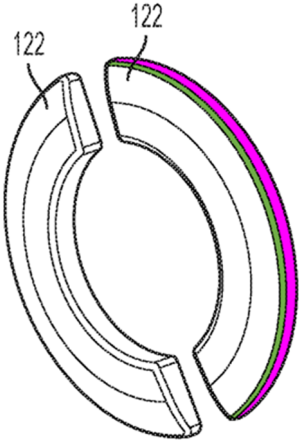
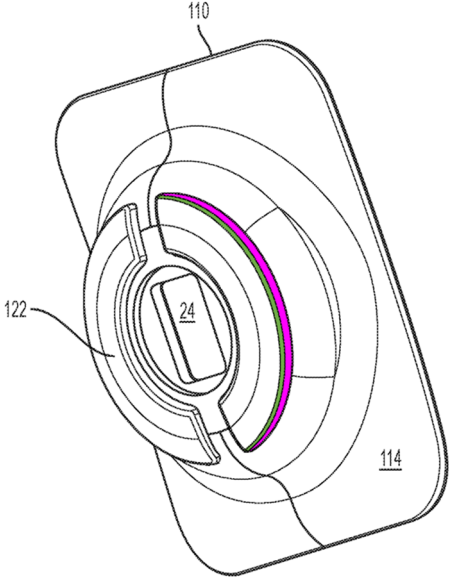
60. If the claimed arrangement of the arc-shaped portions is considered, the arc-shaped portions of Paulke and the D’842 Patent provide the same overall visual impression, as shown below. Exhibit 1001, FIG. 4; Exhibit 1006, FIG. 1G.



As shown above (right), the arc-shaped portions of Paulke’s design are spaced slightly farther apart than the claimed design, but a DOSA would have understood that that difference, or any difference in the size, shape, or spacing of the arc-shaped

portions of Paulke and the claimed design, does not change the overall visual similarity between those designs. Exhibit 1001, FIG. 4; Exhibit 1006, FIG. 1G. Any differences between the claimed design and Paulke, such as the size of or spacing between arc-shaped portions, would have been changes that a DOSA would have been motivated to make, as I have explained in Section IX.B.3 below.

61. As I have explained above in Section VIII, a DOSA would have understood that the D'842 Patent does not claim the arc-shaped portions' sidewalls. However, if the D'842 Patent claimed the sidewalls depicted in FIG. 2 (i.e., the vertical edges (colored pink below) and chamfered edges (colored green below)), the chamfered edges are functional elements, as explained above in Section VIII.A.2. Therefore, I understand that the chamfered edges, if they are claimed, should be disregarded in the obviousness analysis. Moreover, if the vertical and chamfered edges depicted in FIG. 2 of the D'842 Patent are claimed and considered, Paulke's arc-shaped portions have sidewalls that provide the same overall visual impression, as shown below. Exhibit 1001, FIG. 2; Exhibit 1006, FIG. 2A.

D'842 Patent	Paulke (Exhibit 1006)
 FIG. 2	 FIG. 2A (excerpted)  FIG. 2A (assembled, excerpted)¹

A DOSA would have understood that any differences between the design of Paulke and the claimed design do not alter the same overall visual impression provided by the Paulke and the claimed design. Exhibit 1001, FIG. 2; Exhibit 1006, FIG. 2A.

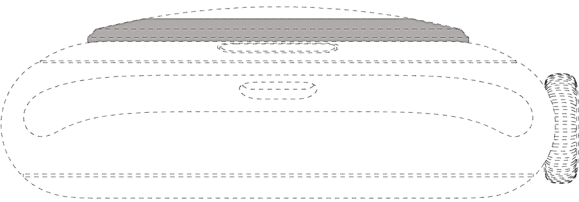
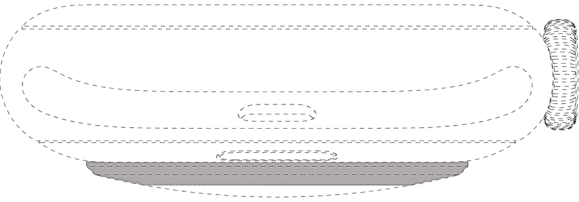
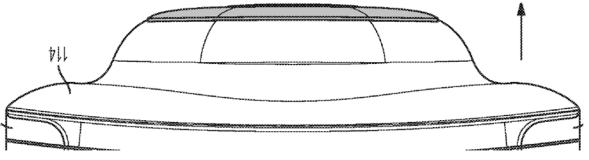
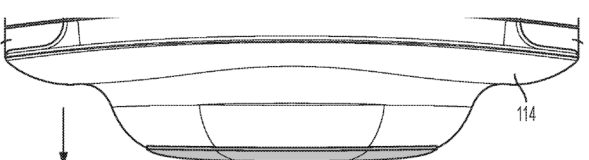
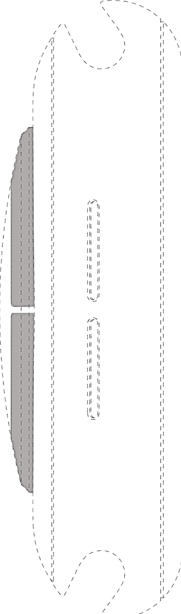
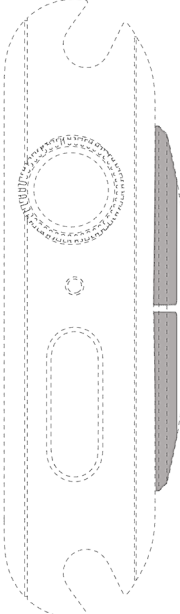
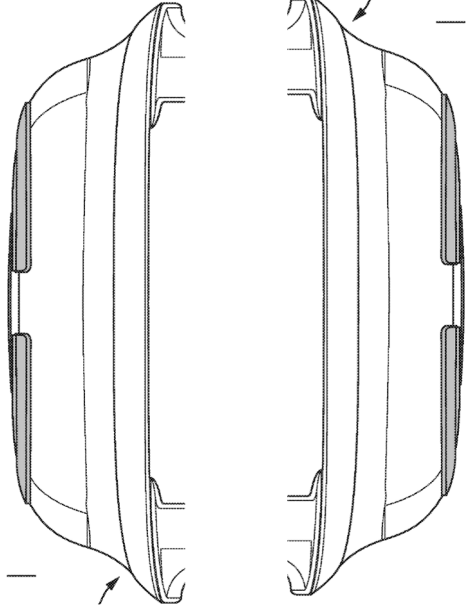
¹ Paulke FIG. 2A would appear as shown when assembled. Exhibit 1006, FIG. 2A.

Accordingly, in my opinion, Paulke discloses an arrangement of arc-shaped portions with basically the same design characteristics as the claimed design.

b. Convex Curvature

62. As explained above in Section VIII.A.1, the claimed convex curvature of the arc-shaped portions is a functional element. Therefore, I understand this aspect should be disregarded in the obviousness analysis.

63. If the claimed convex curvature of the arc-shaped portions is considered, the below figures show that Paulke and the claimed design each have arc-shaped portions with a convex curvature that provides the same overall visual impression. Exhibit 1001, FIGS. 5-8; Exhibit 1006, FIGS. 1D-1E.

D'842 Patent	Paulke (Exhibit 1006)
 FIG. 7  FIG. 8	 FIG. 1D (rotated)  FIG. 1D (rotated)
 FIG. 5  FIG. 6	 FIG. 1E (rotated)

A DOSA would have understood that any difference between and the design of Paulke and the claimed design would not alter the overall visual similarity of Paulke and the claimed design as a whole. Exhibit 1001, FIGS. 2, 5-8; Exhibit 1006, FIGS. 1D-1G.

64. Accordingly, in my opinion, Paulke discloses arc-shaped portions with a convex curvature with basically the same design characteristics as the claimed design.

c. Arrangement of Rectangles

65. As explained above in Section VIII.A.3, the claimed arrangement of rectangles is a functional element. Therefore, I understand that the arrangement of claimed rectangles should be disregarded in the obviousness analysis.

66. If the arrangement of rectangles claimed by the D’842 Patent is disregarded, a DOSA would understand that the claimed design covers any arrangement of rectangles surrounded by, and spaced apart from, the claimed arc-shaped portions. Exhibit 1001, FIGS. 2, 4. Paulke’s design has these same basic design characteristics, as explained below.

67. As shown below in the exploded view of FIG. 2A, Paulke’s arc-shaped portions surround a central biosensor 120, which can include a “heart rate and/or blood oxygen sensor 124” that “protrudes through [an] opening 24 in housing 110 and is protected from the outside by a glass lens 128.” Exhibit 1006, FIGS. 1F-2A, 15:6-9, 14:12-15.

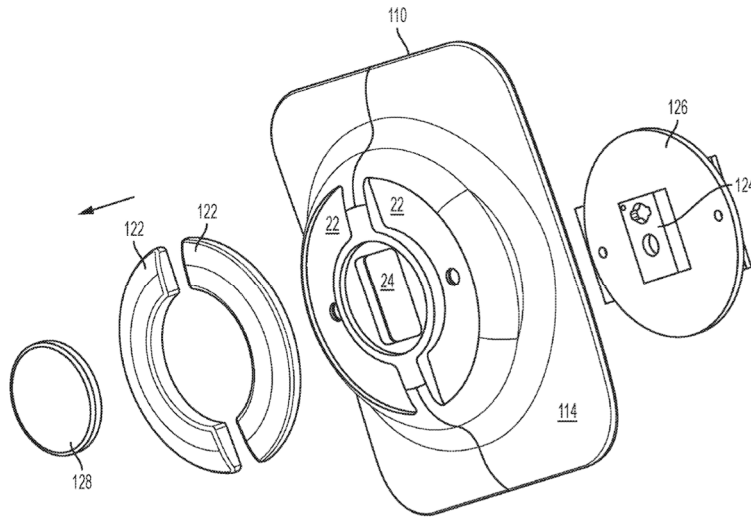


FIG. 2A

Id., FIG. 2A. A DOSA would have understood that if the FIG. 2A configuration shown above was assembled, Paulke's design would appear as shown in the composite figures below.

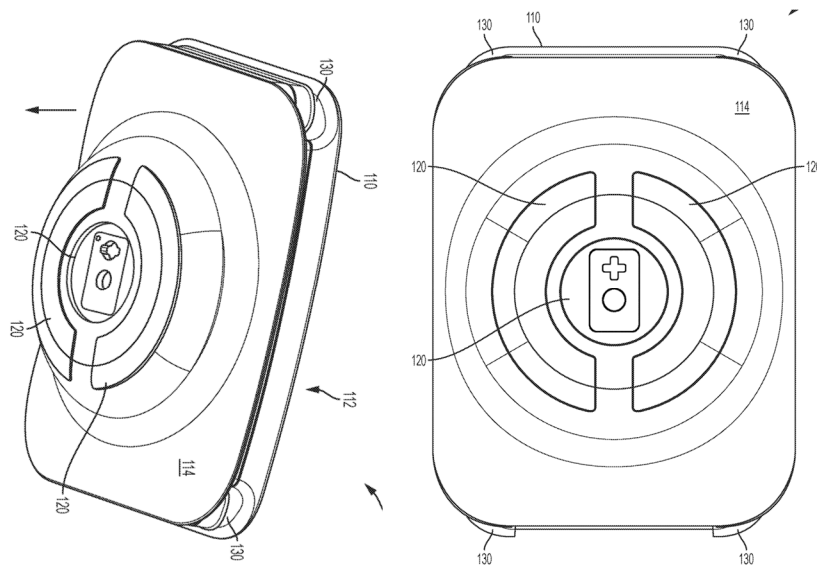
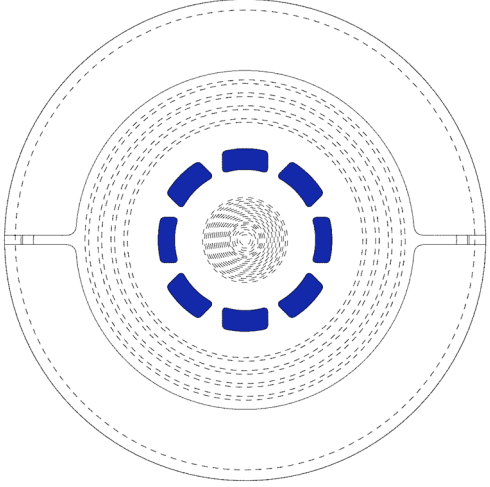
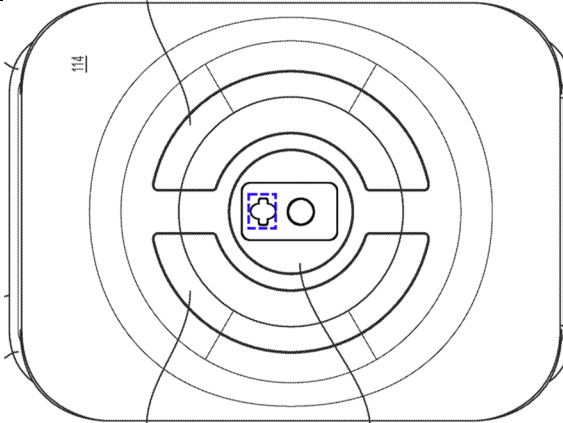
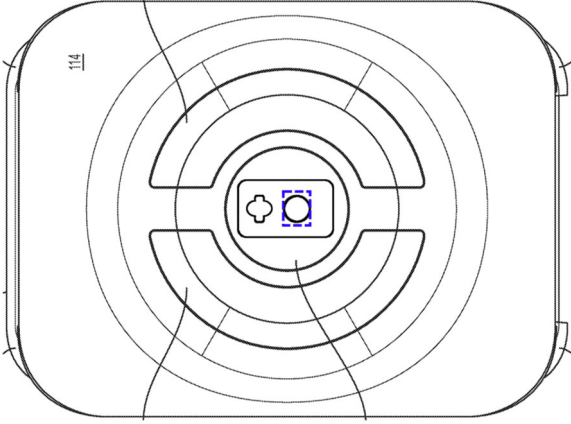


Exhibit 1006, FIGS. 1F (left), 1G (right) (both modified to show central blood oxygen sensor 124 from FIG. 2A).

68. Paulke's blood oxygen sensor 124 is an example of a PPG sensor. Exhibit 1014 ¶72. For Paulke's PPG sensor, or any PPG sensor, to measure blood oxygen (i.e., oxygen saturation), a DOSA would have understood that the sensor must include: a light source (such as LEDs); one or more light detectors (such as photodiodes); and an opening to allow light to reach and be detected by the light detector(s). Exhibit 1011, FIGS. 3-4, 7, 1:33-61, 4:6-65; Exhibit 1014 ¶73. A DOSA also would have known that the use of rectangular photodiodes as light detectors in PPG sensors was ubiquitous. Exhibit 1014 ¶73. A DOSA would have therefore understood that, as shown in the examples below (right), Paulke included a rectangular photodiode (drawn in blue) associated with an opening in its blood oxygen sensor. Exhibit 1006, FIG. 1G; Exhibit 1014 ¶73.

D'842 Patent	Paulke (Exhibit 1006)
 FIG. 4	 FIG. 1G (Composite with FIG. 2A and photodiode of blood oxygen sensor)  FIG. 1G (Composite with FIG. 2A and photodiode of blood oxygen sensor)

As shown above (left), the claimed design includes a circular arrangement of rectangles. As such, a DOSA would have understood that both Paulke and the claimed design provide the same basic design characteristics because both include one or more central rectangles spaced apart from the arc-shaped portions. Further, in my opinion, Paulke would still be an appropriate primary reference even if it did not include a central rectangle because of the overall visual similarity between the

claimed design and Paulke's design (*compare* Exhibit 1001, FIGS. 2, 4-8 *with* Exhibit 1006, FIGS. 1D-2A).

69. Moreover, if the scope of the claimed design is found to include a circular array of eight rectangles shown in FIG. 4 of the patent, Paulke differs from the claimed design because a DOSA would have understood that Paulke only includes the one rectangle shown in the composite figures above. However, in my opinion, this one difference between Paulke and the claimed design does not change that Paulke and the claimed design include basically the same design characteristics. My opinion that any difference between the arrangement of rectangular photodiodes in the claimed design and Paulke would not alter the overall visual similarity of their designs is confirmed by Apple's argument that "there's *nothing* patentable about multiple detectors," which includes photodiodes. Exhibit 1021, 58:3-13 (referring to Exhibit 1038, 2 and arguing "[r]eference after reference speaks to [Apple's argument that there is nothing patentable about multiple detectors (i.e., photodiodes) in an optical sensor]).

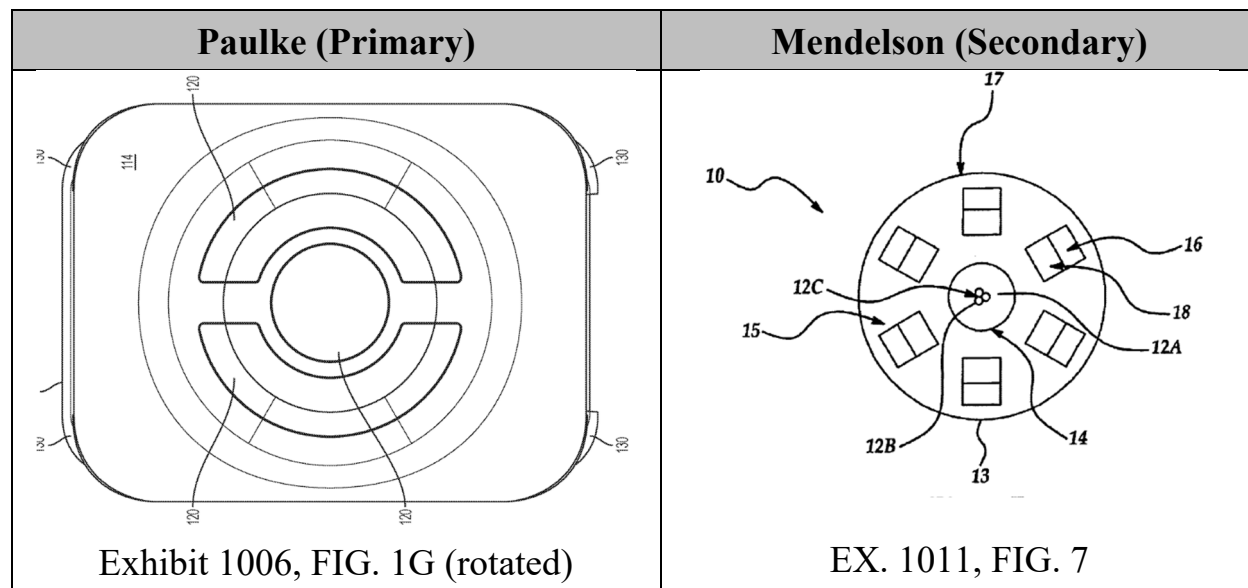
70. Accordingly, in my opinion, Paulke discloses a design with the same basic design characteristics as the claimed design.

71. Overall, for the reasons above, it is my opinion that Paulke is an appropriate primary reference because it discloses basically the same visual impression as the claimed design. If the claimed arrangement of rectangles is

considered as part of the obviousness analysis, Paulke's single difference from the claimed design is that Paulke's design has only one central rectangle instead of a circular array of eight rectangles. However, as I have discussed below in Section IX.B.3, any difference between Paulke and the claimed design was suggested by the prior art and was a change that a DOSA would have been motivated to make. Thus, in my opinion, Paulke is a suitable primary reference despite any differences between its design and the claimed design.

2. Mendelson Is An Appropriate Secondary Reference to Combine with Paulke

72. As shown below, the design of Mendelson's circular PPG sensor is so related to Paulke's design that the appearance of Mendelson's circular PPG sensor would have suggested that a DOSA combine Mendelson's features, including its circular array of six or twelve rectangular photodiodes, with Paulke's device.



Paulke explains that its central circular biosensor 120 may be a blood oxygen sensor 124 (also known as a pulse oximeter or oxygen saturation sensor), which can be replaced with “any suitable biosensor(s)” including “heart rate, pulse rate,” and “oxygen saturation sensors.” Exhibit 1006, 15:9-18. A DOSA, therefore, would have understood that Paulke expressly suggests replacing its central blood oxygen sensor with a suitable oxygen saturation sensor. *Id.*

73. Mendelson’s FIG. 7 oxygen saturation sensor (above, right) has a circular shape like the central biosensor 120 of Paulke and the circular area occupied by Paulke’s blood oxygen sensor 124 (above, left). Exhibit 1006, FIGS. 1G, 2A; Exhibit 1011, FIG. 7. This similarity between the circular shape of Mendelson’s sensor and the central biosensor of Paulke would have suggested to a DOSA to use Mendelson’s sensor with Paulke’s device, as shown in the following composite figure.

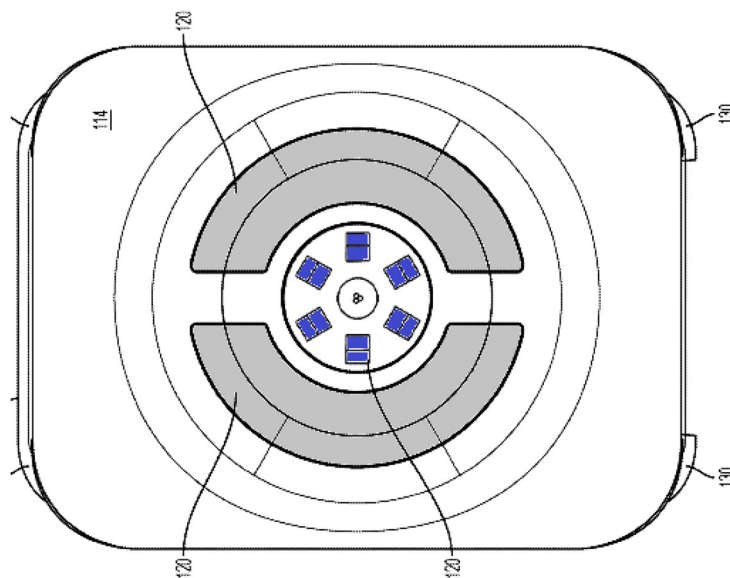


Exhibit 1006, FIG. 1G (composite figure including Mendelson's sensor (Exhibit 1011, FIG. 7) as Paulke's central biosensor). Additionally, a DOSA would have understood that Paulke and Mendelson are related because Paulke suggests combining its device with a suitable oxygen saturation sensor, and Mendelson is a suitable oxygen saturation for Paulke's device. Exhibit 1006, 15:9-18, FIG. 1G; Exhibit 1011, FIG. 7, 9:22-40; Exhibit 1014 ¶79. Also, a DOSA would have understood that the designs were related because Paulke and Mendelson's blood oxygen sensors require the same basic components, including a light source (such as LEDs) and light detector(s) (such as photodiodes). Exhibit 1014 ¶¶73, 77. Therefore, given the relatedness and similarity of Paulke and Mendelson's designs, the appearance of Mendelson's FIG. 7 sensor would have suggested the application of its features, including its circular array of rectangular photodiodes, to the design of Paulke's central biosensor. As such, it is my opinion that Mendelson is an appropriate secondary reference to combine with Paulke.

3. The Challenged Claim of the D'842 Patent Would Have Been Obvious to a DOSA Over Paulke Combined with Mendelson

74. As Apple has argued, using circular arrangements of six or more rectangular photodiodes (colored purple in the below figures) in an optical sensor was ubiquitous in the prior art.

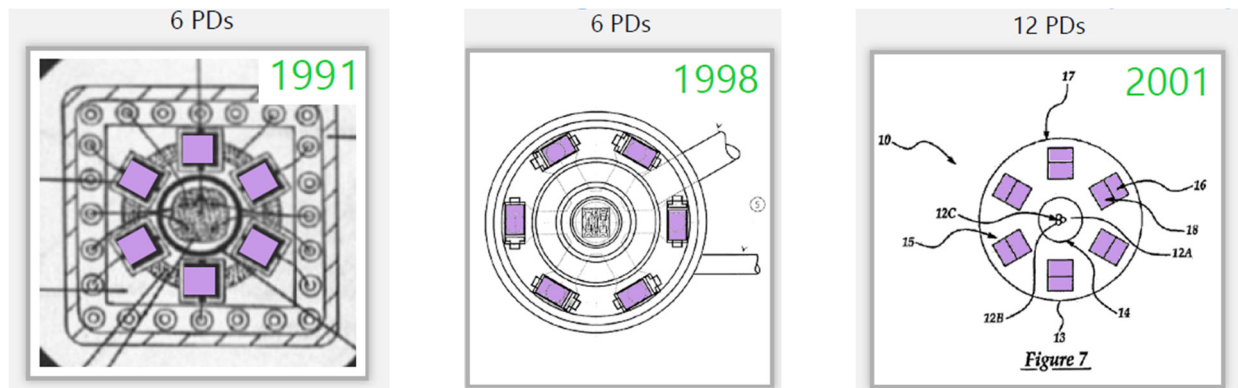


Exhibit 1038, 2 (excerpted). Indeed, Apple argued that “every one of these devices [shown on Exhibit 1038, 2] has ... multiple photodiodes.” Exhibit 1021, 58:3-13; Exhibit 1017 at 59-60 (arguing that “[since] at least 1978” and “[p]rior to 2008, it also was known that optical sensors could include four or more photodiodes”). Apple’s technical expert, Dr. Warren, opined that, years before the date of the D’842 Patent, “[a POSITA] would have known you could include a plurality of photodiodes” in a sensor that were “arranged radially, meaning in a circular arrangement.” Exhibit 1021, 1191:21-1192:6. Therefore, it is my opinion that using Mendelson’s circular arrangement of photodiodes with Paulke’s device would have been a change that was suggested by the prior art (*see, e.g.*, Exhibit 1006, 15:9-18) and well within the knowledge, experience, skill, and creativity of a DOSA in June 2018.

75. In my opinion, a DOSA would have been motivated, for many reasons, to use the sensor from FIG. 7 of Mendelson in place of Paulke’s central blood oxygen sensor. Paulke suggests this combination by teaching that “any suitable

biosensor(s)” including an “oxygen saturation sensor” may be used for its central circular biosensor. Exhibit 1006, 15:9-18. Also, the design of Mendelson’s FIG. 7 sensor is so related to Paulke, as discussed in the prior section, that their relatedness would have suggested to a DOSA to combine Mendelson’s sensor, including its circular arrangement of rectangular photodiodes, with Paulke’s device. Exhibit 1006, 15:9-18; Exhibit 1011, FIG. 7.

76. Moreover, for many reasons, a DOSA would have been motivated to combine Paulke’s device with Mendelson’s sensor, as proposed herein, to achieve a symmetrical sensor design. A DOSA would have been motivated to replace the asymmetrical design of Paulke’s blood oxygen sensor 124 (Exhibit 1006, FIG. 2A) with Mendelson’s FIG. 7 symmetrical sensor design to achieve the more marketable and visually appealing symmetrical design shown in the following composite figure.

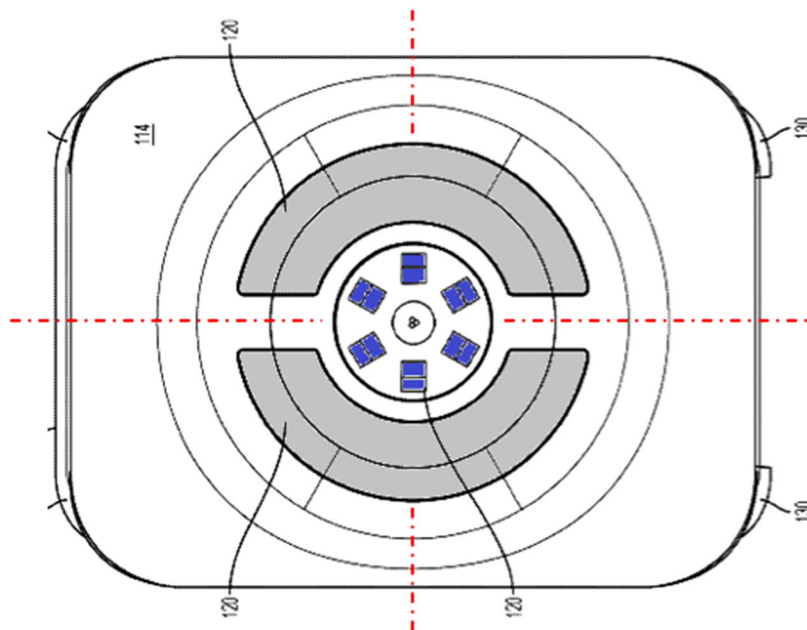


Exhibit 1006, FIG. 1G (composite figure combined with Exhibit 1011, FIG. 7, showing axes of symmetry in red). A DOSA also would have been motivated to combine Paulke's device with the symmetrical sensor design of FIG. 7 of Mendelson's FIG. 7 because the combination would be visually cohesive with the symmetry of Paulke's arc-shaped and circular biosensors. *Id.*, FIGS. 1F-3C, 12C, 16A, 17A. A DOSA likewise would have been motivated to combine Paulke with Mendelson's FIG. 7 sensor design to achieve the more visually appealing design in which the overall sensor, including its arc-shaped portions and central sensor, was symmetric about the vertical and horizontal axes of the device, as shown in the composite figure above. *Id.*, FIGS. 1F-1G. While the knowledge and experience of a DOSA would have independently supplied this motivation, a DOSA would have recognized that Paulke provided this motivation because in almost every Paulke embodiment, the outer and central biosensors are symmetric about the device's horizontal and vertical axes in plan view. *Id.*, FIGS. 1-3, 12-22. Additionally, I understand that Mendelson's FIG. 7 sensor design with one or more radially-symmetric arrays of rectangular photodiodes was known to improve PPG sensor accuracy. Exhibit 1011, 4:14-16, 4:59-62, 9:22-40; Exhibit 1014 ¶80. Thus, a DOSA would have been motivated to combine Mendelson's FIG. 7 sensor design with Paulke's device to provide a design with increased PPG sensor accuracy. *Id.* I also understand that using just one of Mendelson's circular arrays of rectangular

photodiodes, rather than both arrays (16/18) of the FIG. 7 sensor, would have been known to improve the accuracy of Paulke's blood oxygen sensor 124. Exhibit 1011, FIG. 7, 9:22-34; Exhibit 1014 ¶81. Thus, a DOSA would have been motivated to combine Mendelson's FIG. 7 sensor design, but with only one array of six rectangular photodiodes, with Paulke's device to provide a design with increased PPG sensor accuracy, as shown in the following composite figure. *Id.* A DOSA also would have been motivated to use the one six-photodiode array from Mendelson (shown in the following composite figure) instead of two concentric six-photodiode arrays for visual simplicity.

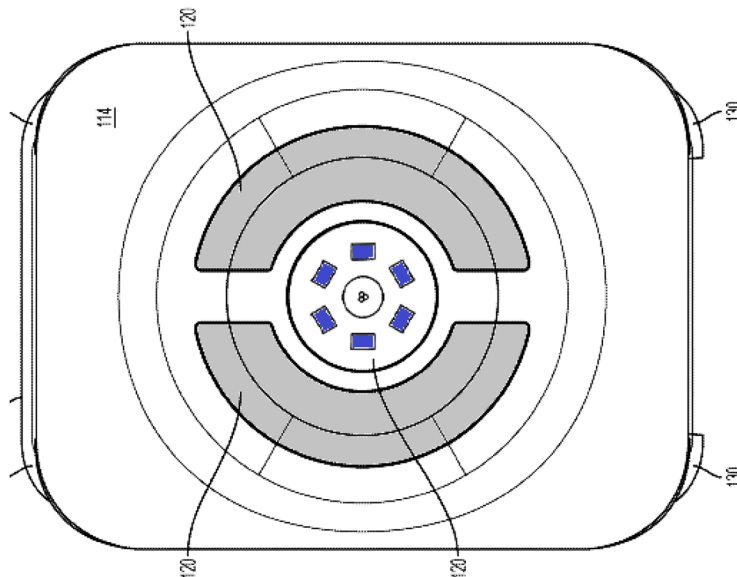


Exhibit 1006, FIG. 1G (composite figure combined with one six-photodiode array from Mendelson's sensor (Exhibit 1011, FIG. 7)). A DOSA would have understood that the difference between the above design (the above composite figure) with its six-rectangle array and the claimed eight-rectangle array was a change suggested by

the prior art. Specifically, I understand that Mendelson motivates using more photodiodes to improve the sensor's accuracy. Exhibit 1011, 4:6-16, 4:59-62; Exhibit 1014 ¶81. Therefore, a DOSA would have been motivated to use more than six rectangular photodiodes to improve the PPG sensor accuracy of Paulke's device. *Id.* A DOSA thus would have been motivated to use a larger, even number of rectangular photodiodes in Paulke's array, such as eight or ten rectangular photodiodes, because doing so would improve Paulke's PPG sensor accuracy while retaining the visually appealing symmetry of the overall design. *Id.*

77. The rectangles in the array claimed by the D'842 Patent are curved, but the rectangular photodiodes of Mendelson are straight. Exhibit 1001, FIG. 4; Exhibit 1011, FIG. 7. However, a DOSA would have understood that this difference represented a modification known in the art, as Apple showed by arguing that there was "nothing patentable" about sensors with multiple photodiodes. Exhibit 1021, 58:3-13; *see also id.*, 1191:21-1192:6 (Apple's expert, Dr. Warren, arguing that "A person of ordinary skill would have known at that time [in 2008] that you could include a plurality of photodiodes[,] ... [including] four of more [photodiodes] where they could be arranged radially, meaning [photodiodes] in a circular arrangement"); Exhibit 1032, 2-3. A DOSA also would have been motivated to apply a slight curvature to the array of rectangular photodiodes added to Paulke because doing so would visually parallel the curved shape of Paulke's (or Yuen's

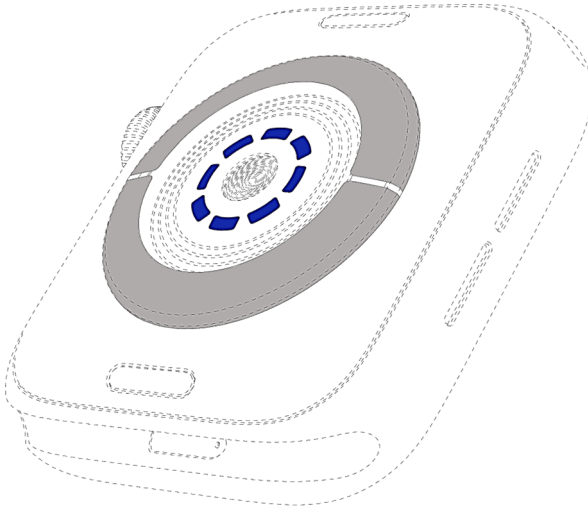
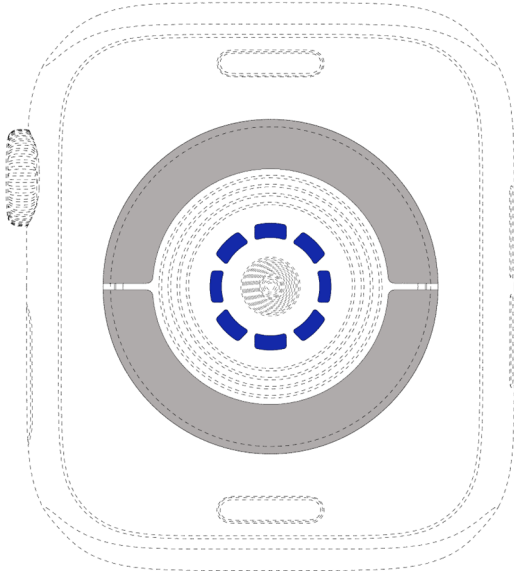
(Exhibit 1007) or Fong's (Exhibit 1008)) arc-shaped portions and the overall circular shape Paulke's (or Yuen or Fong's) sensor and device. Exhibit 1006, FIGS. 1A-1C, 2B, 5A-5B. Further, a DOSA would have been motivated to apply a slight curvature to the array of rectangular photodiodes added to Paulke (or Yuen (Exhibit 1007) or Fong (Exhibit 1008)) because a DOSA would have understood that using the same curvature for design aspects positioned over the face of the sensor would provide a cohesive, simplistic, and visually appealing theme of concentric circles. Exhibit 1006, FIGS. 1A-1C, 2B, 5A-5B; *see also* Exhibit 1007, FIGS. 1A, 3-4; Exhibit 1008, FIGS. 1-8; EX1011, FIG. 7.

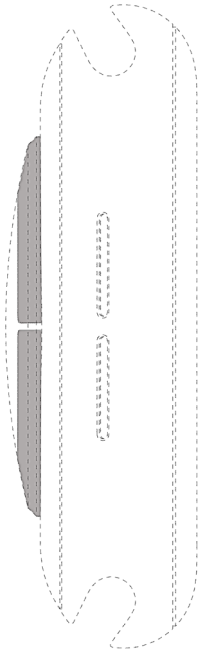
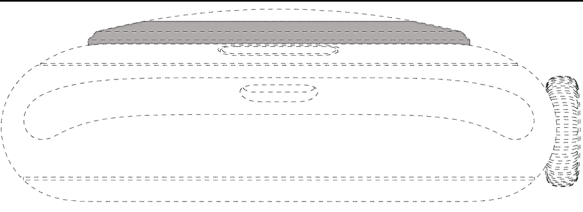
78. In my opinion, a DOSA would have understood that any differences between the proposed combination of Paulke with Mendelson and the claimed design were changes that were disclosed in the prior art. A DOSA would have understood that any the D'842 Patent does not claim specific dimensions and that any difference between the precise spacing, shape, or size of arc-shaped portions in Paulke (or Yuen or Fong) and the claimed design would be routine, easily implemented modifications. For example, Paulke teaches that "[a]ny suitable arrangement, alignment, shape, size" could be used for its arc-shaped and central biosensors. Exhibit 1006, 15:22-23. I also understand that it is important for the arc-shaped electrodes to maintain contact with the user's skin to be able to sense electrical impulses through the skin. *Id.*, 14:29-32 (explaining the arc-shaped

electrodes “detect and/or more electrodermal activity (e.g., skin conductance) of the wearer”), 15:22-26 (explaining “[a]ny suitable arrangement, alignment, shape, size, etc., of biosensor(s) may be utilized” including the exemplary biosensor arrangements “illustrated in FIG. 2B”), 15:3-5 (teaching to shape arc-shaped portions “to help maintain contact between biosensors 120 and the wearer’s skin”), 5:31-32 (Paulke’s devices “hold the biosensors in a way that promotes accuracy of the measurements by the biosensor”), 6:5-7 (Paulke’s device’s “maintain[] one or more of the electronic components in contact with the wearer’s wrist”), 13:13-16 (“one or more biosensors positioned and configured to be held by the wrist band assembly in contact with ... the wearer’s wrist”), 16:1-4 (“the module housing the sensor(s) may be designed to be worn tight against the wearer’s body surface ... to tend to maintain contact between the sensor(s) and the wearer’s body surface as the body surface moves”); Exhibit 1014 ¶82. Therefore, a DOSA would have been motivated to extend the ends of the arc-shaped electrodes of Paulke (and Yuen and Fong) closer together to maximize the electrode surface area available to contact the user’s skin. *Id.* Further, I understand that electrodes are typically made of a conductive metal or coating that would interfere with wireless charging if the electrode overlapped the charging coil and interfere with optical sensing if the electrode overlapped the optical sensor. Exhibit 1014 ¶84; Exhibit 1024, 17:22-31. Thus, a DOSA would have been motivated to ensure that the electrodes in the

proposed combination were shaped and sized to avoid interference with any wireless charging coil and optical sensor of Paulke's device. *Id.* Lastly, a DOSA would have understood that any difference between the chamfered edges of Paulke (or Yuen or Fong) and the claimed design were modifications that were taught by the prior art, which Apple acknowledged by arguing that "the use of chamfered edges" was "well-known in the art," "had been around for many decades, and was disclosed in multiple [prior art] references" as providing the benefit of improved user comfort. Exhibit 1017, 114.

79. Therefore, for the foregoing reasons, it is my opinion that a DOSA would have been motivated to combine Paulke with Mendelson's FIG. 7 sensor to create a sensor, as shown in the composite figures below, that provides the same overall visual appearance as the design claimed by the D'842 Patent. The following composite figures accurately reflect my analysis above and show how a DOSA would have combined Paulke with Mendelson.

D'842 Patent	Paulke Combined with Mendelson
 FIG. 2	
 FIG. 4	

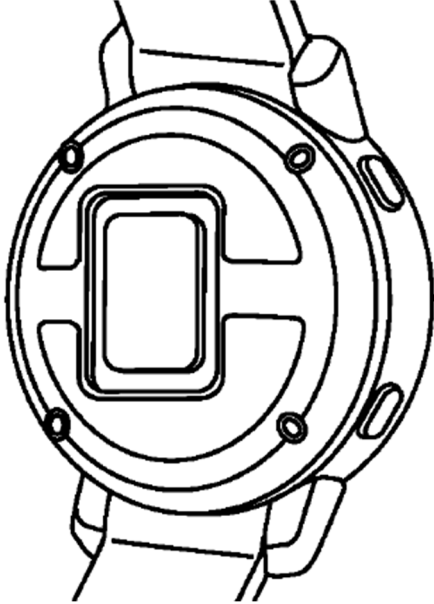
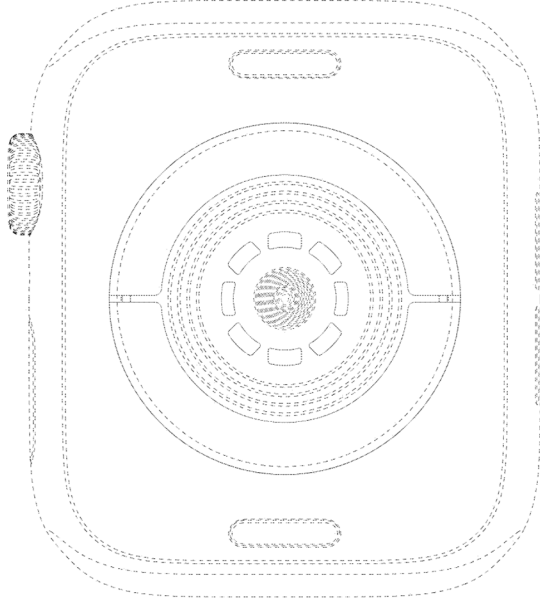
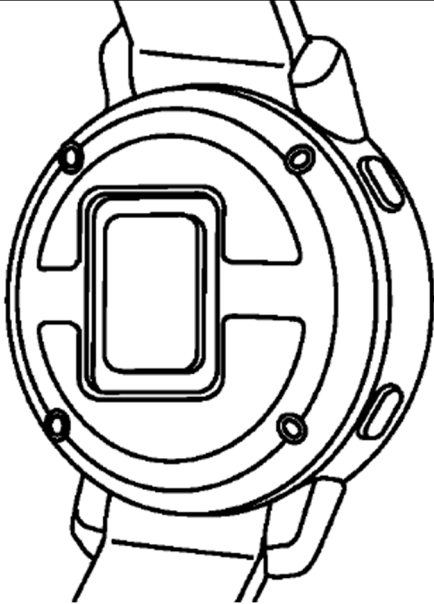
D'842 Patent	Paulke Combined with Mendelson
 FIG. 5	
 FIG. 7	

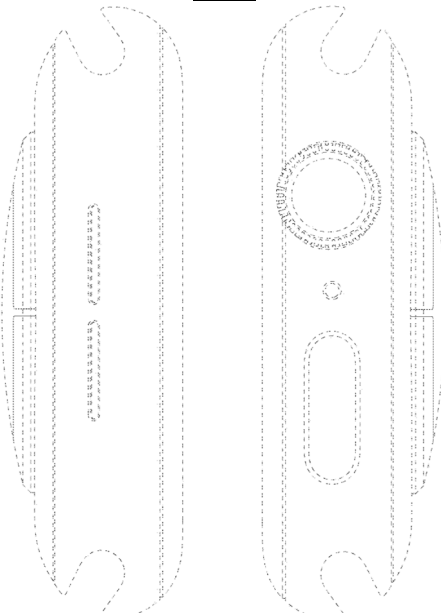
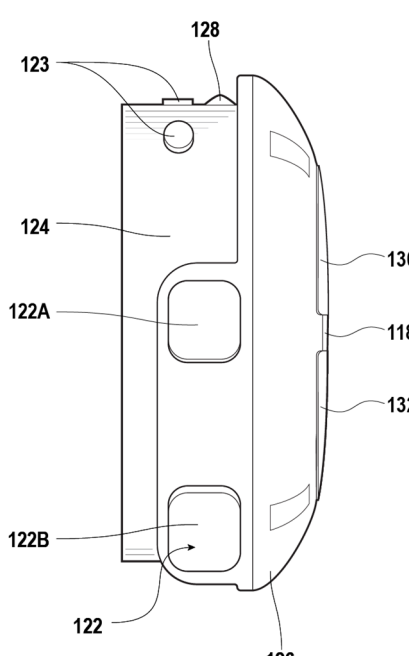
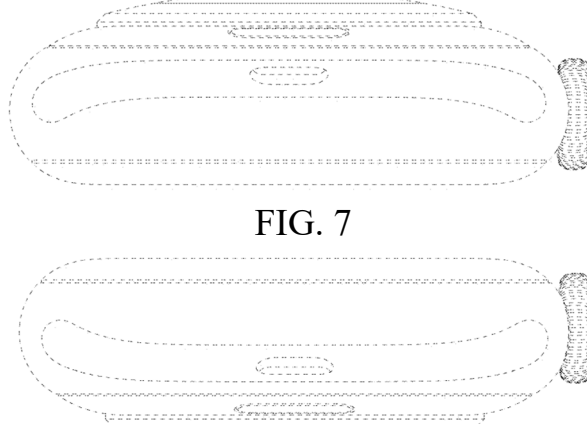
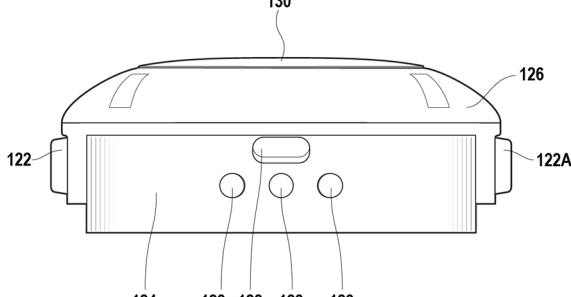
It is thus my opinion that the design claimed by the D'842 Patent would have been obvious to a DOSA over Paulke and Mendelson.

C. [Ground 2] The Challenged Claim of the D'842 Patent Would Have Been Obvious Over Yuen Combined With Mendelson and Bushnell

1. Yuen Is A Primary Reference for the D'842 Patent

80. As shown in the comparison below, the design characteristics of Yuen are basically the same as the claimed design:

D'842 Patent	Yuen (Exhibit 1007)
 FIG. 2	 FIG. 4 (flipped)
 FIG. 4	 FIG. 4 (flipped)

D'842 Patent	Yuen (Exhibit 1007)
 FIG. 5 FIG. 6	 Composite of FIGS. 1B, 3-4
 FIG. 7 FIG. 8	 Composite of FIGS. 1B, 3-4

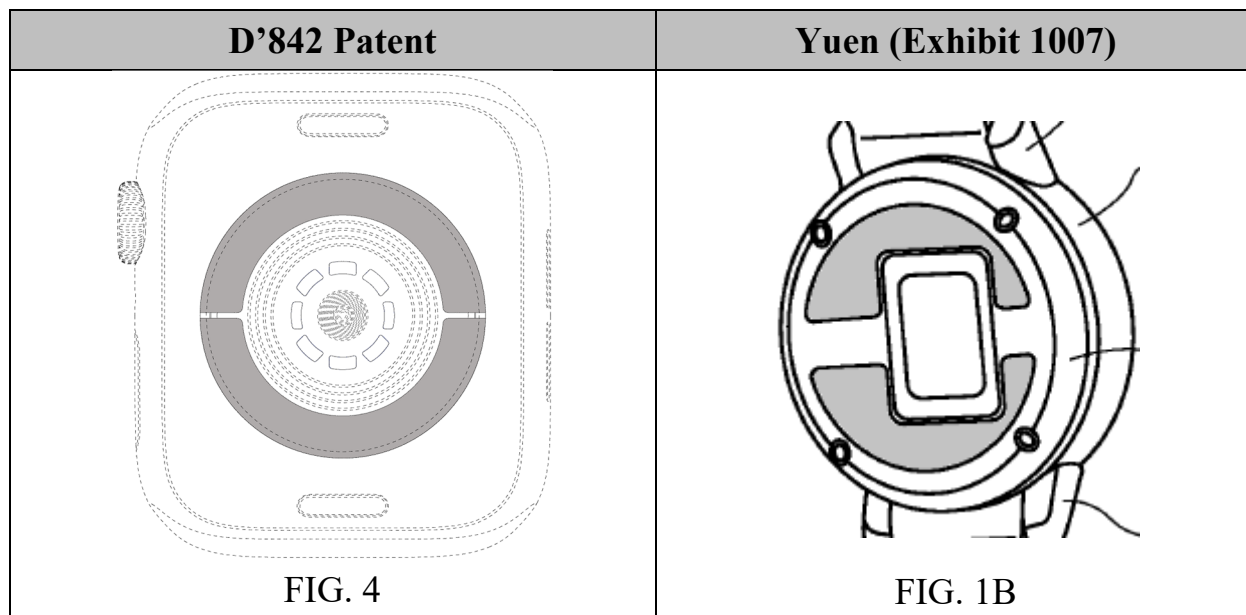
The above comparison demonstrates that Yuen is an appropriate primary reference because its design conveys basically the same overall visual impression as the claimed design. *Compare* Exhibit 1001, FIGS. 2, 4-8 *with* Exhibit 1007, FIGS. 1B, 3-4. Additionally, the following comparison of the respective design aspects of

Yuen and the claimed design demonstrates the overall visual similarity between these designs.

a. Arc-Shaped Portions

81. As explained above in Section VIII.A.2, the claimed arrangement of the arc-shaped portions is a functional element. Therefore, I understand this aspect should be disregarded in the obviousness analysis.

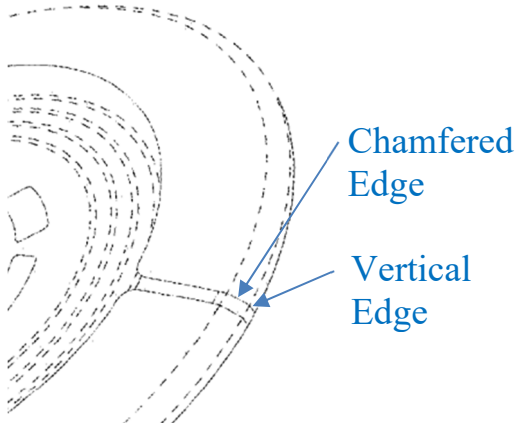
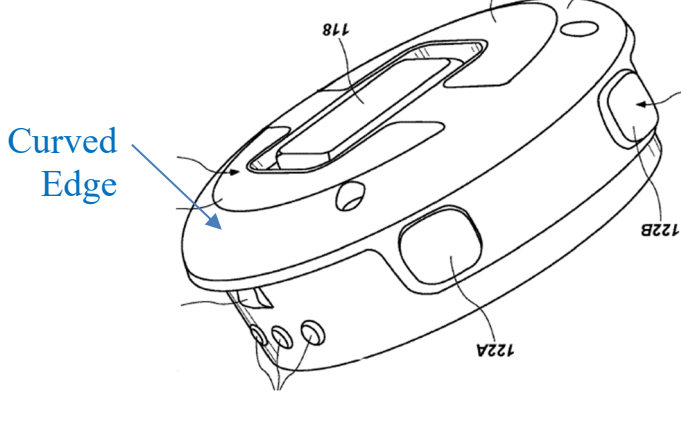
82. If the claimed arrangement of the arc-shaped portions is considered, the designs of Yuen and the D’842 Patent provide the same overall visual impression, as shown below. Exhibit 1001, FIG. 4; Exhibit 1007, FIG. 1B.



As shown above (right), the arc-shaped portions of Yuen’s design have a slightly different shape and spacing than the claimed design, but a DOSA would have understood that such a difference, or any difference in the size, shape, or spacing of the arc-shaped portions of Paulke and the claimed design do not change the overall

visual similarity between those designs. Exhibit 1001, FIG. 4; Exhibit 1007, FIG. 1B. Any differences between the claimed design and Yuen, such as the shape, size of, or spacing between arc-shaped portions, would have been changes that a DOSA would have been motivated to make, as I have explained in Section IX.C.3 below.

83. As I have explained above in Section VIII, a DOSA would have understood that the D'842 Patent does not claim the arc-shaped portions' sidewalls. However, if the D'842 Patent claimed the sidewalls depicted in FIG. 2, the chamfered edges are functional elements, as explained above in Section VIII.A.2. Therefore, I understand that the chamfered edges, if they are claimed, should be disregarded in the obviousness analysis. Moreover, if the vertical and chamfered edges depicted in FIG. 2 of the D'842 Patent are claimed and considered, Yuen's design is slightly different because the sidewall of its device has a curved edge (as shown below, right) rather than vertical and chamfered edges (as shown below, left). Exhibit 1001, FIG. 2; Exhibit 1007, FIG. 3A.

D'842 Patent	Yuen (Exhibit 1007)
 FIG. 2	 FIG. 3A (rotated)

However, a DOSA would have understood that any differences between the design of Yuen and the claimed design do not alter the same overall visual impression provided by the Yuen and the claimed design. Exhibit 1001, FIG. 2; Exhibit 1007, FIGS. 1B, 3-4.

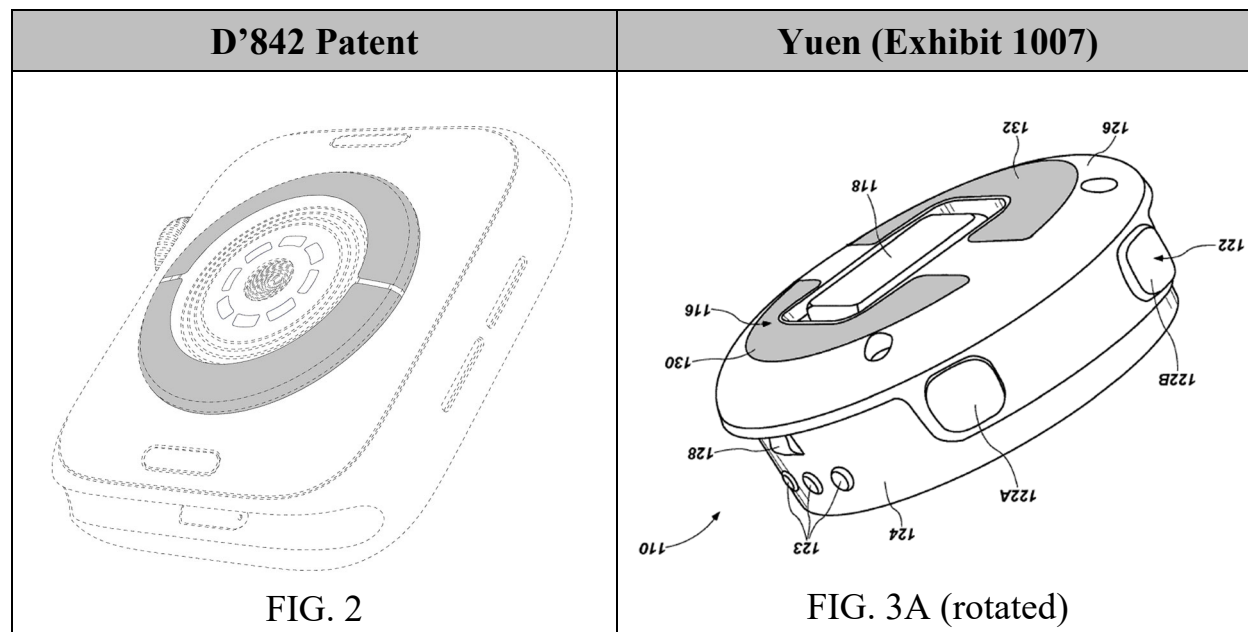
84. Accordingly, in my opinion, Yuen discloses an arrangement of arc-shaped portions with basically the same design characteristics as the claimed design.

b. Convex Curvature

85. As explained above in Section VIII.A.1, the claimed convex curvature of the arc-shaped portions is a functional element. Therefore, I understand this aspect should be disregarded in the obviousness analysis.

86. If the claimed convex curvature of the arc-shaped portions is considered, the below figures show that Yuen and the claimed design each have arc-

shaped with a convex curvature that provides the same overall visual impression. Exhibit 1001, FIGS. 2, 5-8; Exhibit 1007, FIG. 3A.



A DOSA would have understood that any difference between the design of Yuen and the claimed design did not alter the overall visual similarity between these designs as a whole. Exhibit 1001, FIGS. 2, 5-8; Exhibit 1007, FIGS. 1B, 3-4.

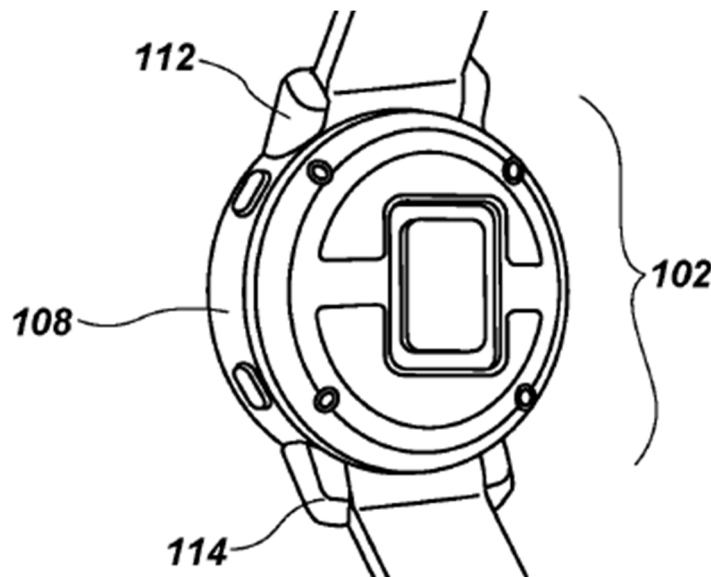
87. Accordingly, in my opinion, Yuen discloses arc-shaped portions with a convex curvature with basically the same design characteristics as the claimed design.

c. Arrangement of Rectangles

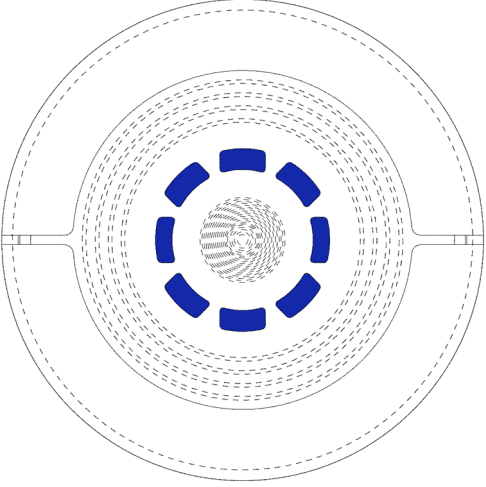
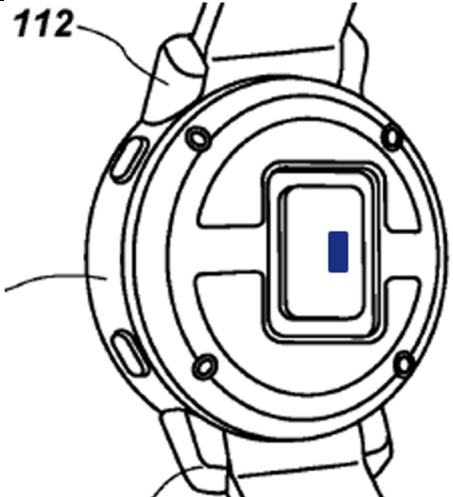
88. As explained above in Section VIII.A.3, the claimed arrangement of rectangles is a functional element. Therefore, I understand that the arrangement of claimed rectangles should be disregarded in the obviousness analysis.

89. If the arrangement of rectangles claimed by the D’842 Patent is disregarded, a DOSA would understand that the claimed design covers any arrangement of rectangles surrounded by, and spaced apart from, the claimed arc-shaped portions. Exhibit 1001, FIGS. 2, 4. Yuen’s design has these same basic design characteristics, as explained below.

90. The arc-shaped portions of Yuen surround a central PPG sensor 118, which Yuen teaches can be “any PPG sensor 118 known in the art.” As shown in the following figure, Yuen’s PPG sensor 118 “extend[s] through the back cover 126 in a location in-between electrodes of the ... ECG sensor 116.” *Id.* ¶42.



Id., FIG. 4. For the reasons I explained above in Section IX.B.1.c regarding the central PPG sensor of Paulke, a DOSA also would have understood that Yuen’s PPG sensor included at least one rectangular photodiode (drawn in blue), as shown in the exemplary composite figure below (right). Exhibit 1007, FIG. 4; Exhibit 1014 ¶74.

D'842 Patent	Yuen (Exhibit 1007)
 FIG. 4	 FIG. 4 (Composite with exemplary photodiode)

As shown above (left), the claimed design includes a circular arrangement of rectangles. As such, a DOSA would have understood that both Yuen and the claimed design provide the same basic design characteristics because both include one or more central rectangles spaced apart from the arc-shaped portions. Further, in my opinion, Yuen would still be an appropriate primary reference even if it did not include a central rectangle because of the overall visual similarity between the claimed design and Yuen's design (*compare* Exhibit 1001, FIGS. 2, 4-8 *with* Exhibit 1007, FIGS. 1B, 3-4).

91. Moreover, if the scope of the claimed design is found to include a circular array of eight rectangles shown in FIG. 4 of the patent, Yuen differs from the claimed design because a DOSA would have understood that Yuen only includes the one rectangle shown in the composite figure above. However, it is my opinion

that this difference does not change that Yuen and the claimed design include basically the same design characteristics, for each of the reasons explained above in Section IX.B.1.c regarding this design aspect and Paulke.

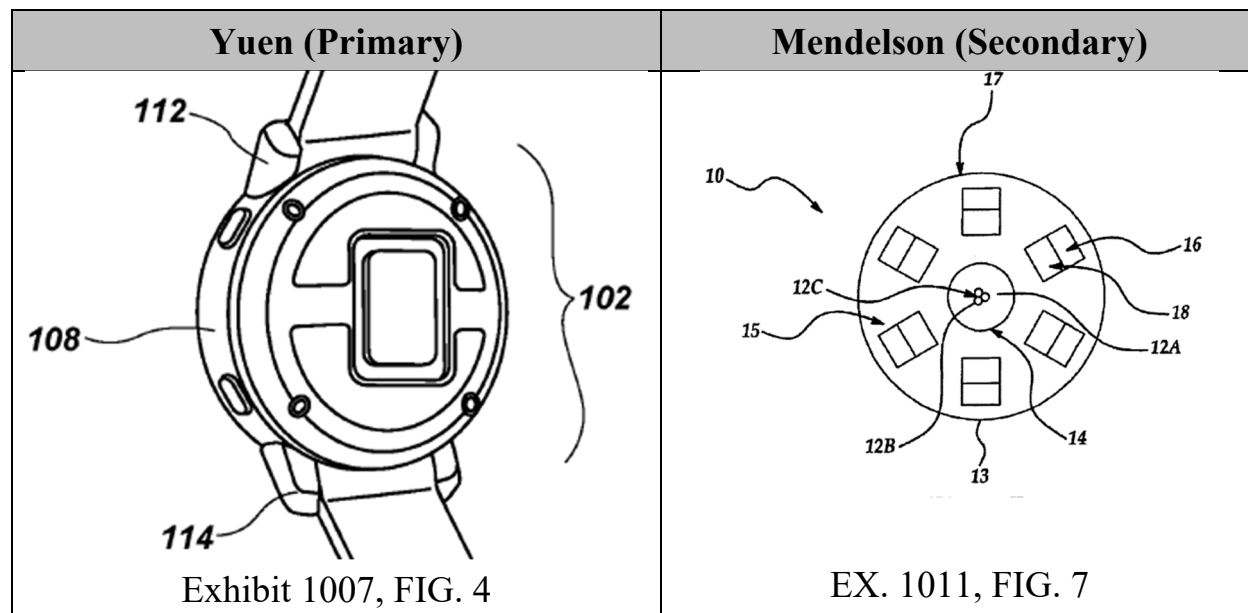
92. Accordingly, in my opinion, Yuen discloses a design with the same basic design characteristics as the claimed design.

93. Overall, for the reasons above, it is my opinion that Yuen is an appropriate primary reference because it discloses basically the same visual impression as the claimed design. If the claimed arrangement of rectangles is considered as part of the obviousness analysis, Yuen's single difference from the claimed design is that Yuen's design has only one central rectangle instead of a circular array of eight rectangles. If the sidewalls shown in FIG. 2 of the D'842 Patent are found to be within the scope of the claimed design, Yuen would also differ slightly, as I have explained above in Section IX.C.1.a. However, as I have discussed below in Section IX.C.3, any difference between Yuen and the claimed design was suggested by the prior art and was a change that a DOSA would have been motivated to make. Thus, in my opinion, Yuen is a suitable primary reference despite any differences between its design and the claimed design.

2. Mendelson and Bushnell Are Appropriate Secondary References to Combine with Yuen

94. As shown below, the design of Mendelson's circular PPG sensor is so related to Yuen's design that the appearance of Mendelson's circular PPG sensor

would have suggested that a DOSA combine Mendelson’s features, including its circular array of six or twelve rectangular photodiodes, with Yuen’s device.



Yuen explains that its arc-shaped electrodes 130, 132 surround a central PPG sensor 118 that may be “any PPG sensor 118 known in the art,” including any known sensor “for optically detecting changes in a blood flow volume through a tissue via reflection from ... the tissue.” Exhibit 1007 ¶¶35, 41-42, FIGS. 1B, 3-4. A DOSA, therefore, would have understood that Yuen expressly suggests replacing its central PPG sensor with a suitable prior art PPG sensor. *Id.* ¶41.

95. As shown above, Mendelson’s FIG. 7 PPG sensor (right) has a circular shape that is especially suitable for the available area between Yuen’s arc-shaped electrodes (right). Exhibit 1007, FIGS. 1B, 3-4; Exhibit 1011, FIG. 7. This similarity between the circular shape of Mendelson’s sensor and the available area

for a central PPG sensor in Yuen's design would have suggested to a DOSA to use Mendelson's sensor with Yuen's device, as shown in the following composite figure.

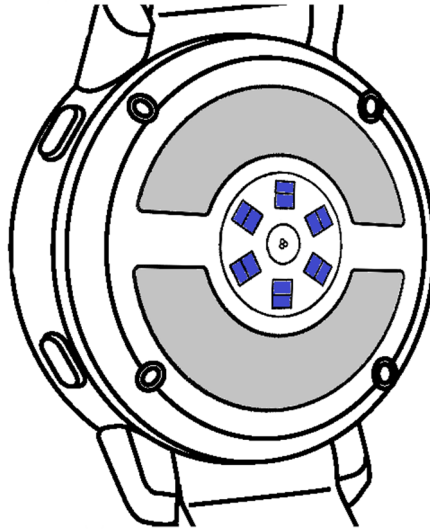
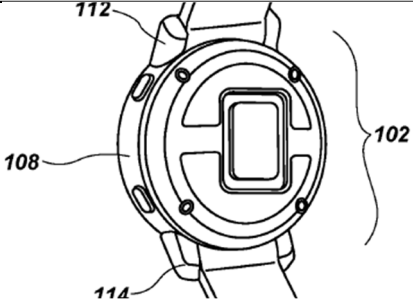
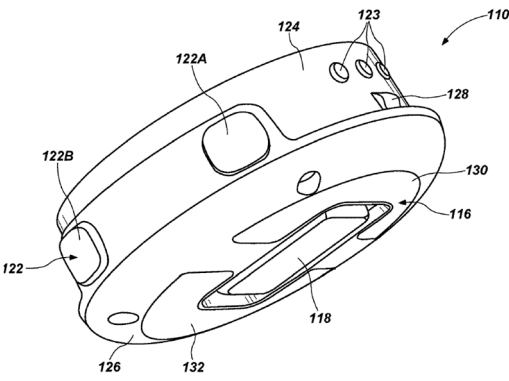
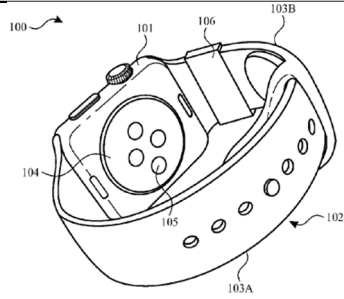
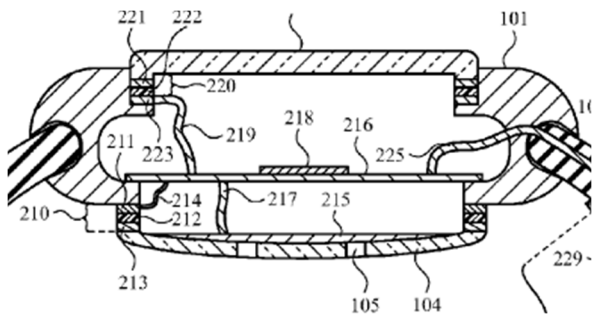


Exhibit 1007, FIG. 4 (composite figure including Mendelson's sensor (Exhibit 1011, FIG. 7) as Yuen's central PPG sensor). Additionally, a DOSA would have understood that Yuen and Mendelson are related because Yuen suggests combining its device with a suitable PPG sensor, and Mendelson is a suitable PPG sensor for Yuen's device. Exhibit 1007, FIGS. 1B, 3-4, ¶41; Exhibit 1011, FIG. 7, 9:22-40; Exhibit 1014 ¶86. Also, a DOSA would have understood that the designs were related because Yuen and Mendelson's PPG sensors require the same basic components, including a light source (such as LEDs) and light detector(s) (such as photodiodes). Exhibit 1014 ¶¶74, 77. Therefore, given the relatedness and similarity of Yuen and Mendelson's designs, the appearance of Mendelson's FIG. 7 sensor would have suggested the application of its features, including its circular array of

rectangular photodiodes, to the design of Yuen’s central PPG sensor. As such, it is my opinion that Mendelson is an appropriate secondary reference to combine with Yuen.

96. Further, as shown below, the design of Bushnell’s sensor is so related to Yuen’s design that the appearance of Bushnell’s sensor would have suggested that a DOSA combine its features, including its housing component 104, with Yuen’s device.

Yuen (Primary)	Bushnell (Secondary)
 Exhibit 1007, FIG. 4  EX. 1007, FIG. 3A	 EX. 1009, FIG. 1A  EX. 1009, FIG. 2A

Yuen’s design (above, left) has arc-shaped electrodes, a central PPG sensor, and a circular convex surface protruding from the back of the wrist-worn electronic device.

Exhibit 1007, FIGS. 1B, 3-4, Abstract, ¶¶35-36, 41-42. Similarly, Bushnell’s design includes electrodes, a central PPG sensor, and a circular convex surface protruding from the back of the wrist-worn electronic device. Exhibit 1009, FIGS. 1-7, ¶¶40, 48 (“the health sensor 215 may be a photoplethysmogram (PPG) sensor that emits light through the sensor windows 105 into the user’s body part 230 and receives the portion of the transmitted light that is reflected back from the user’s body part 230.”), 74 (describing “multiple electrodes ... positioned on the housing component”).

97. Bushnell is so related to Yuen because, as shown above, both sensor designs involve a circular, convex surface that protrudes from the back of the wrist-worn electronic device and houses the devices electrodes and PPG sensor. Exhibit 1007, FIGS. 1B, 3-4, ¶¶35-36, 41-42; Exhibit 1009, FIGS. 1A, 2A, ¶¶40, 48, 74. Additionally, the visual similarity between the convex curvature and the overall circular shape of Bushnell’s housing component 104 (or 304, 404, 504, etc.) to Yuen’s convex protruding back surface 126 would have suggested to a DOSA to use Bushnell’s design for Yuen’s device. Exhibit 1007, FIGS. 1B, 3-4; Exhibit 1009, FIGS. 1-7. Bushnell and Yuen’s sensor designs are also closely related because in both designs, the convex protruding surface (in Yuen, the back surface 126; in Bushnell, the housing component 104) incorporates the electrodes and a PPG sensor. Exhibit 1007, FIGS. 1B, 3-4, ¶¶35-36, 41-42; Exhibit 1009, FIGS. 1-7, ¶¶40, 48, 74 (describing “multiple electrodes ... positioned on the [convex] housing

component”). Bushnell and Yuen’s designs are also related because Yuen expressly suggests combining its device with “any PPG sensor 118 known in the art,” and Bushnell includes such a PPG sensor. Exhibit 1007 ¶41; Exhibit 1009 ¶48, FIGS. 2A-2B. A DOSA would have understood that the designs were further related because Yuen and Bushnell’s PPG sensors require the same basic components, including a light source (such as LEDs) and light detector(s) (such as photodiodes). Exhibit 1014 ¶¶74, 76. Therefore, given the relatedness and similarity of Yuen and Bushnell’s designs, the appearance of Bushnell’s sensor design would have suggested the application of its features, including its convex housing component, to the design of Yuen’s device. As such, it is my opinion that Bushnell is an appropriate secondary reference to combine with Yuen.

3. The Challenged Claim of the D’842 Patent Would Have Been Obvious to a DOSA Over Yuen Combined with Mendelson and Bushnell

98. For the reasons explained above in Section IX.B.3 regarding using Mendelson’s sensor with Paulke’s device, it is my opinion that using Mendelson’s circular arrangement of photodiodes with Yuen’s device would have been a change that was suggested by Yuen (Exhibit 1007 ¶41) and other prior art (*see, e.g.*, Exhibit 1006, 15:9-18) and well within the knowledge, experience, skill, and creativity of a DOSA in June 2018.

99. Additionally, in my opinion, a DOSA would have been motivated for a variety of reasons to use Mendelson's FIG. 7 sensor design with Yuen's device. A DOSA would have understood that Yuen suggests combining its device with "any PPG sensor 118 known in the art." Exhibit 1007 ¶41. As explained above in Section IX.B.3, Mendelson's FIG. 7 sensor is PPG sensor design that was well-known in the art. Thus, Yuen suggests combining its device with Mendelson's PPG sensor design. *Id.* Also, the design of Mendelson's FIG. 7 sensor is so related to Yuen, as discussed in the prior section, that their relatedness would have suggested to a DOSA to combine Mendelson's sensor, including its circular arrangement of rectangular photodiodes, with Yuen's device. Exhibit 1007, FIGS. 1B, 3-4, ¶41; Exhibit 1011, FIG. 7. Additionally, a DOSA would have been motivated to combine Mendelson's FIG. 7 sensor design with Yuen's device to achieve a symmetrical sensor design for the reasons explained above in Section IX.B.3. A DOSA also would have been motivated to replace the asymmetrical design of Yuen's PPG sensor 118 (Exhibit 1007, FIGS. 1B, 3-4) with Mendelson's FIG. 7 symmetrical sensor design to achieve the more marketable and visually appealing symmetrical design shown in the following composite figure.

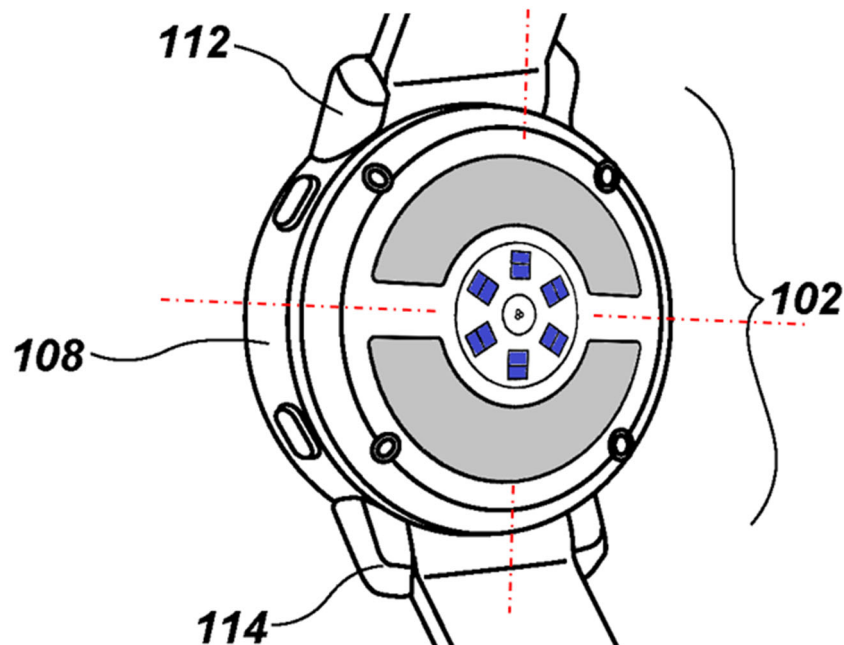


Exhibit 1007, FIG. 4 (composite figure combined with Exhibit 1011, FIG. 7, showing axes of symmetry in red). Additionally, for the reasons I have explained above in Section IX.B.3, a DOSA would have been motivated to combine Mendelson's FIG. 7 sensor design with Yuen's device to provide a design with increased PPG sensor accuracy. A DOSA also would have been motivated to combine Mendelson's FIG. 7 sensor with Yuen's device because the modification would result in a design that was visually cohesive with the overall circular shape of Yuen's device and the circular shape formed by Yuen's arc-shaped electrodes. Exhibit 1007, FIGS. 1B, 3-4. A DOSA also would have been motivated to combine Yuen's device with one six-photodiode array from Mendelson instead of two concentric six-photodiode arrays, as shown in the following composite figure, for the reasons explained above in Section IX.B.3.

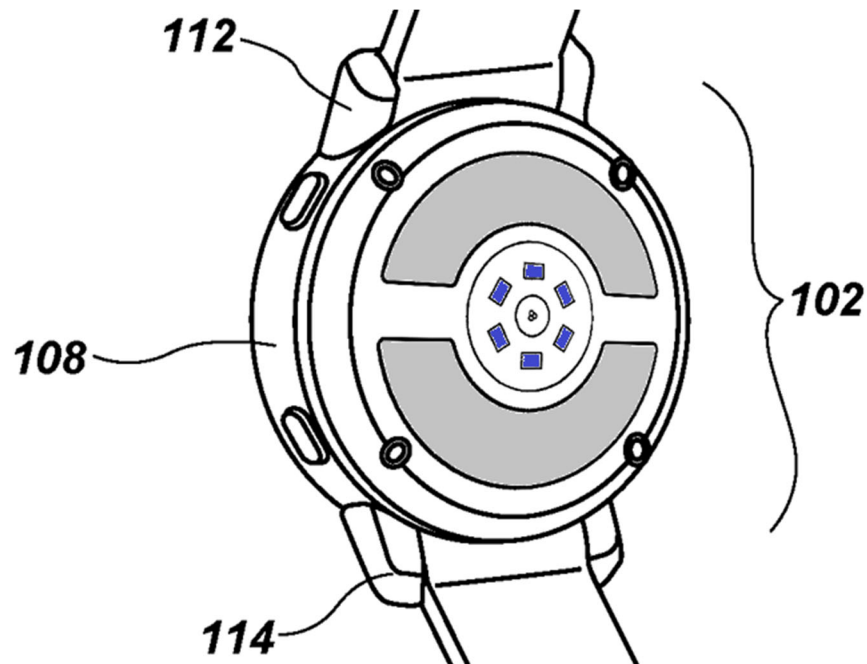


Exhibit 1007, FIG. 4 (composite figure combined with one six-photodiode array from Mendelson's sensor (Exhibit 1011, FIG. 7)). Lastly, for the reasons I have explained above in Section IX.B.3, the differences between the proposed combination shown in the composite figure above (i.e., a circular array of six straight rectangles) and the claimed design (i.e., a circular array of eight curved rectangles) would have been changes that a DOSA would have been motivated to make. Accordingly, it is my opinion that a DOSA would have been motivated for numerous reasons to combine Mendelson's FIG. 7 sensor design with Yuen's device as proposed herein.

100. Moreover, in my opinion, combining Bushnell's housing component 104 with Yuen's device would have been a change that was suggested by the prior art (like Yuen) and well within a DOSA's capabilities. For example, suggests

combining its device with a known PPG sensor (Exhibit 1007 ¶41), and Bushnell's housing component is part of a prior art PPG sensor (Exhibit 1009 ¶48, FIGS. 1-2. Apple also confirmed that this combination of Yuen with Bushnell would have been a simple modification by arguing during the parties' ITC Investigation that sensors with convex protruding features, including the examples in yellow below (and which Bushnell's housing component 104 is a further example of), were well-known in the art many years before the D'842 Patent.

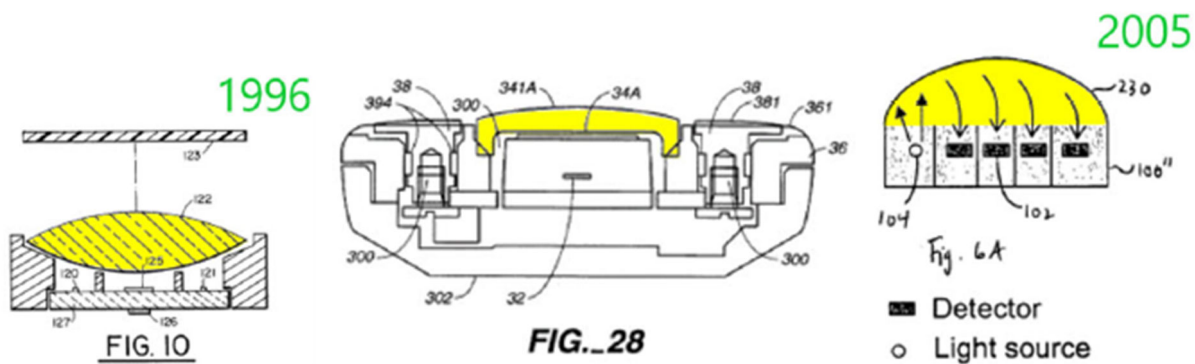


Exhibit 1017, 64 (excerpted), 63 (arguing that “prior to 2008, it also was known that optical sensors could include protrusions, including convex protrusions.”), 22 (arguing that “convex protrusions” had been known “for more than 50 years”), 75 (arguing that “a POSITA would have understood the benefits of including a convex protrusion, including to improve signal quality.”). Apple and its expert also argued that combining a convex protruding feature with an optical sensor would have been an obvious modification that was expected to succeed because Apple argued the combination had been “already been done in various forms,” well before the D’842 Patent. Exhibit 1017, 120 (quoting Exhibit 1021, 1237:4-1238:6).

101. Further, in my opinion, a DOSA would have been motivated for a variety of reasons to combine Bushnell's housing component 104 design with Yuen's device. A DOSA would have been motivated to Bushnell's convex housing component 104 with Yuen's device to achieve the smooth, simplistic, and visually appealing back surface known in the art for such devices, as shown in Bushnell for example (below).

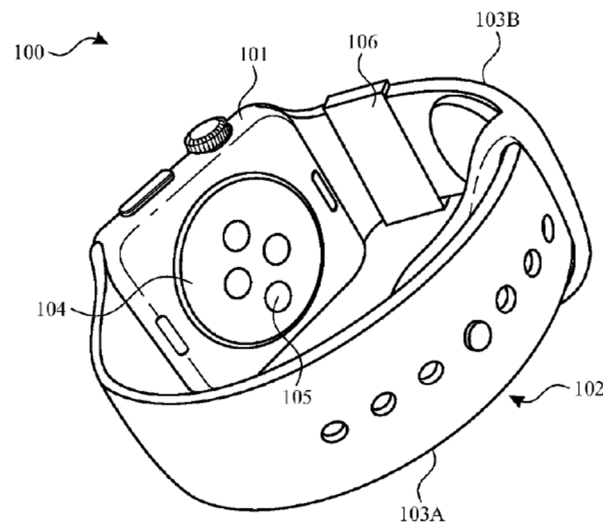


FIG. 1A

Exhibit 1009, FIG. 1A. For multiple reasons, a DOSA would have found that Bushnell's convex housing component was more visually appealing than Yuen's design. First, a DOSA would have found Bushnell's convex housing component more visually appealing because Yuen's design has a jagged and uneven appearance created by the recessed area around Yuen's PPG sensor 118. Second, a DOSA would have found Bushnell's convex housing component more visually appealing because the rectilinear shape of Yuen's PPG sensor 118 creates an appearance that

is inharmonious with the surrounding circular shapes (e.g., Yuen’s overall device shape and the circular shape formed by Yuen’s arc-shaped electrodes). *Id.* Thus, a DOSA would have been motivated to combine Bushnell’s convex housing component with Yuen to overcome these shortcomings in the appearance of Yuen’s design. *Id.*; Exhibit 1009, FIGS. 1-2. A DOSA also would have been motivated to combine Bushnell’s convex housing component with Yuen’s device to cover and protect Yuen’s PPG sensor from damage, the environment (e.g., water, sweat, etc.), and/or debris. Exhibit 1006, 15:6-9 (Paulke’s “[PPG] sensor 124 ... is protected from the outside by a glass lens 128,” as shown in FIG. 2A). Apple confirmed that this motivation to protect Yuen’s PPG sensor existed by arguing that a person of skill would have been motivated to cover optical sensors, which Yuen’s PPG sensor is an example of, to “protect[] the photodiodes from damage or interference caused by contaminants, such as hair, sweat/liquid, dirt, debris, etc.” Exhibit 1017, 119.

102. Additionally, a DOSA would have been motivated to combine Bushnell’s convex housing component with Yuen so that Yuen’s device could align and mate with the corresponding concave surface of wireless chargers known in the prior art, include the examples shown below.



FIG. 10

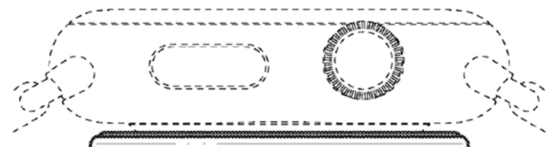


FIG. 11

1800

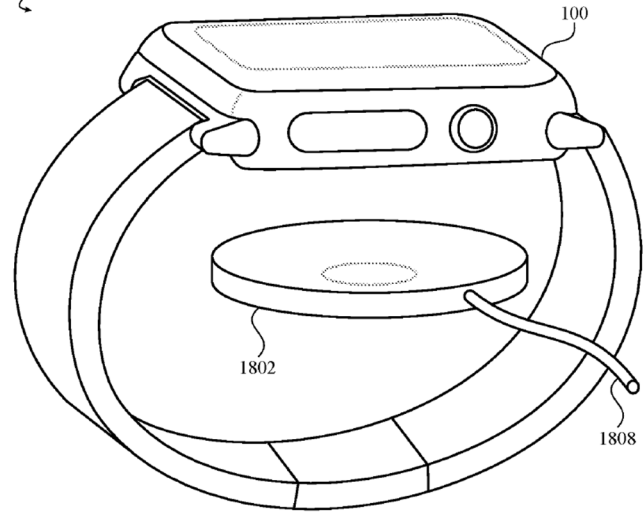


FIG. 18

Exhibit 1034, FIGS. 10-11 (shown above, left); Exhibit 1025, FIG. 18 (shown above, right), FIG. 19, 43:5-25 (discussing use of convex surface on device and complementary concave surface on device's charger dock, as shown in FIG. 18 above, "to effect the desired alignment" between the device and its charging dock), 45:18-51 (explaining that "the complementary geometries [between the device and its charging dock, as shown in FIGS. 18-19] may facilitate alignment of the electronic device and dock for efficient wireless power transfer").

103. A DOSA also would have readily understood that Bushnell's convex housing component 104, shown in red in the figures below, protrudes from the back of the wrist-worn device and thus is a type of convex protruding feature.

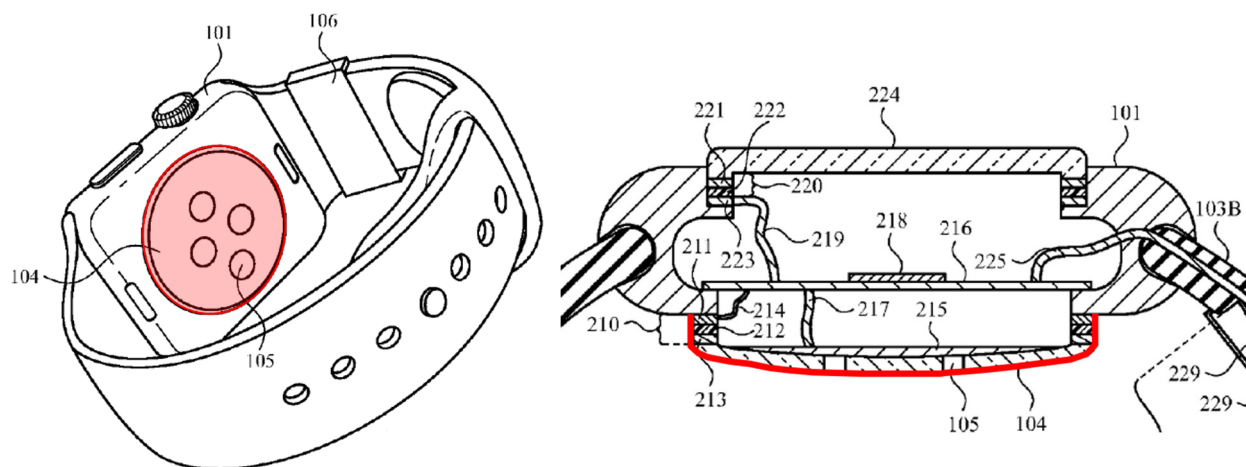


Exhibit 1009, FIGS. 1A, 2A. I understand that it was known in the art that using a convex protruding feature like Bushnell's convex housing component 104 with a PPG sensor would significantly improve the signal strength of the PPG sensor. Exhibit 1014 ¶91. Thus, a DOSA would have been motivated to combine Bushnell's convex housing component with Yuen's device to improve the signal strength of the device's PPG sensor. *Id.* Also, I understand that it was known in the art that using a convex protruding feature like Bushnell's convex housing component with an optical sensor like Yuen was known to improve the contact between the surface of the sensor and the user's skin. Exhibit 1014 ¶92. Thus, a DOSA would have been motivated to combine Bushnell's convex housing component with Yuen's device to improve the contact between Yuen's device and the user's skin when the device was worn. *Id.*

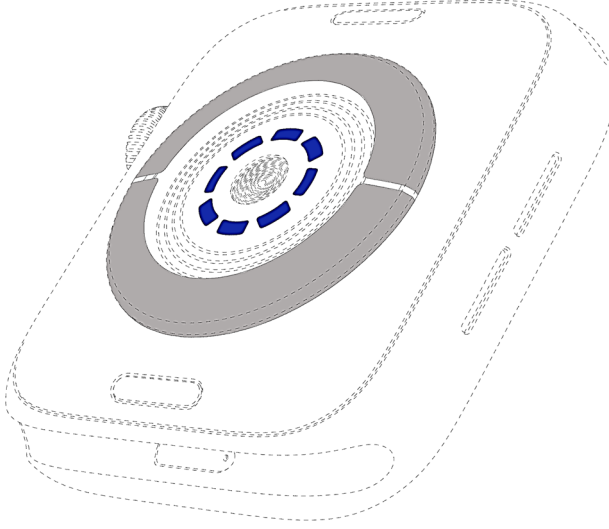
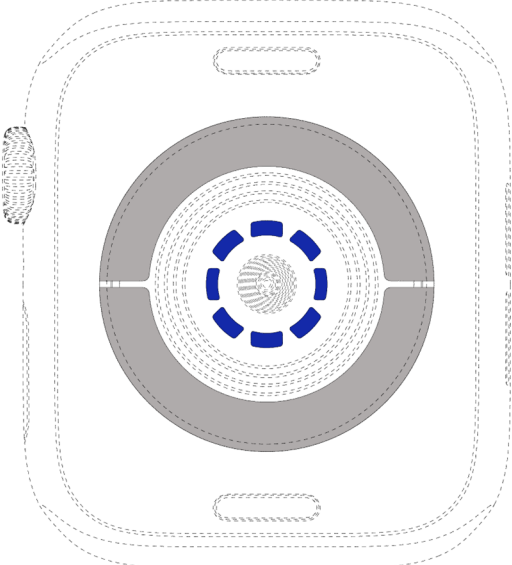
104. Additionally, Bushnell's housing component 104 includes a chamfered edge and a vertical edge between the convex surface of the housing component and

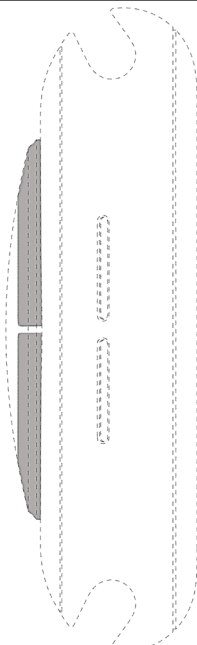
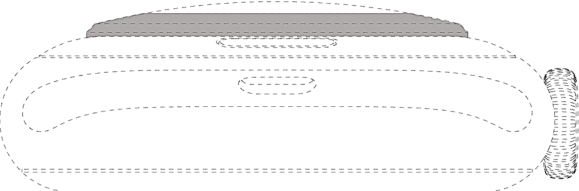
the back of the device, as is shown above in Section IX.A.4. Therefore, a DOSA would have understood that combining Bushnell's convex housing component with Yuen's device would include these features. Moreover, a DOSA would have been motivated to combine Bushnell's chamfered edge with Yuen's device because chamfered edges were a well-known design aspect for providing a simple and visually appealing transition between wearable device elements. Exhibit 1009, FIGS. 1A-1B. A DOSA would have also been motivated to combine Bushnell's chamfered edge with Yuen's device because chamfered edges were "well-known" and "disclosed in multiple [prior art] references" as providing improved user comfort. Exhibit 1017, 114.

105. Lastly, for the reasons I have explained above in Section IX.B.3, any differences between the proposed combination (of Yuen with Mendelson and Bushnell) and the design claimed by the D'842 Patent would have been changes that were taught by the prior art.

106. Therefore, for the foregoing reasons, it is my opinion that a DOSA would have been motivated to combine Yuen with Mendelson's FIG. 7 sensor and Bushnell's convex housing component to create a sensor, as shown in the composite figures below, that provides the same overall visual appearance as the design claimed by the D'842 Patent. The following composite figures accurately reflect my

analysis above and show how a DOSA would have combined Yuen with Mendelson and Bushnell.

D'842 Patent	Yuen Combined with Mendelson and Bushnell
 FIG. 2	
 FIG. 4	

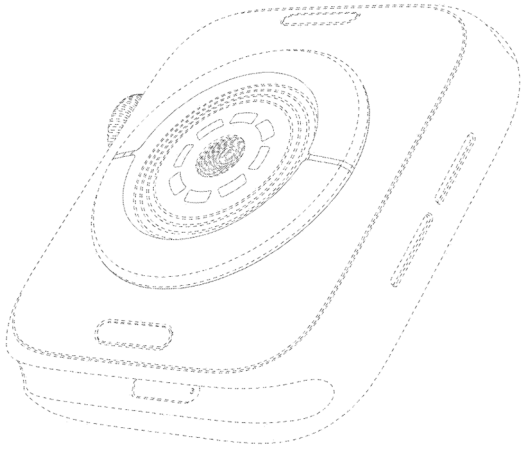
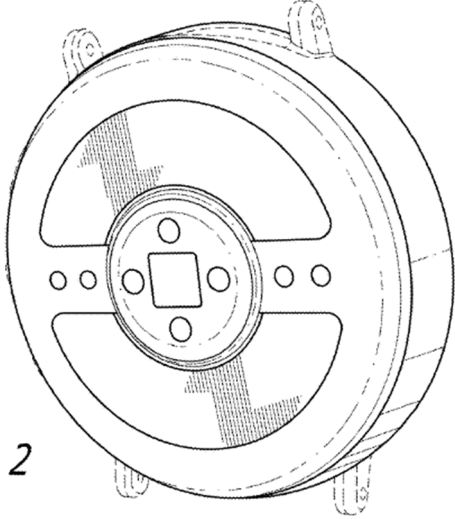
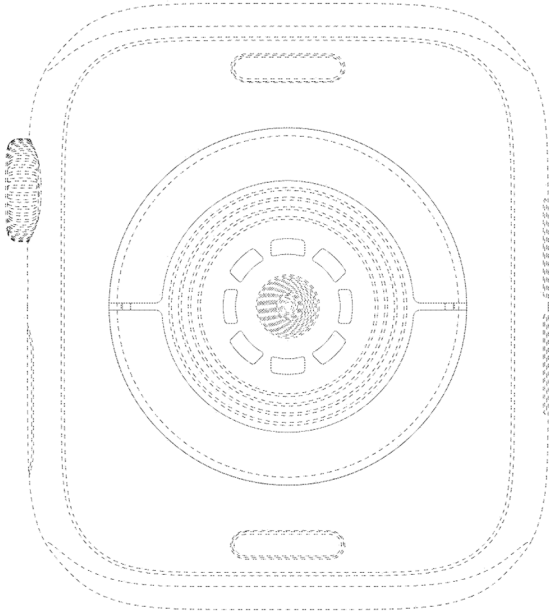
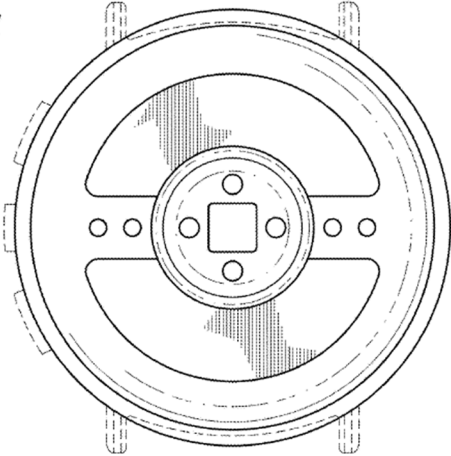
D'842 Patent	Yuen Combined with Mendelson and Bushnell
 FIG. 5	
 FIG. 7	

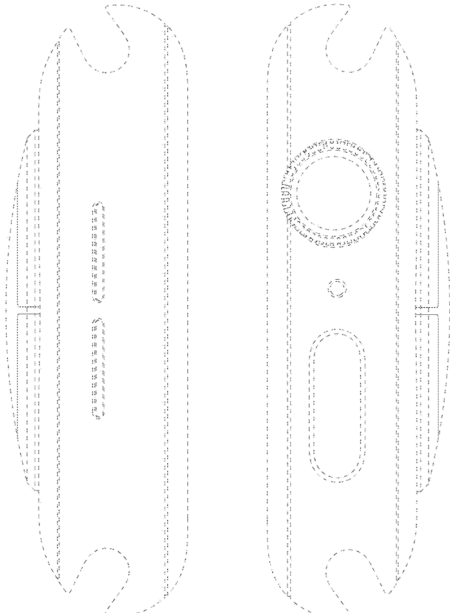
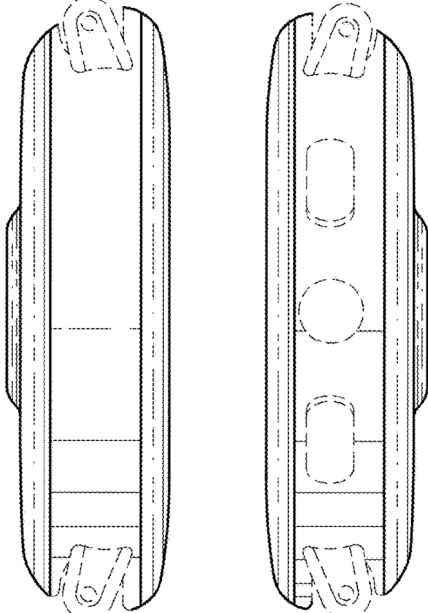
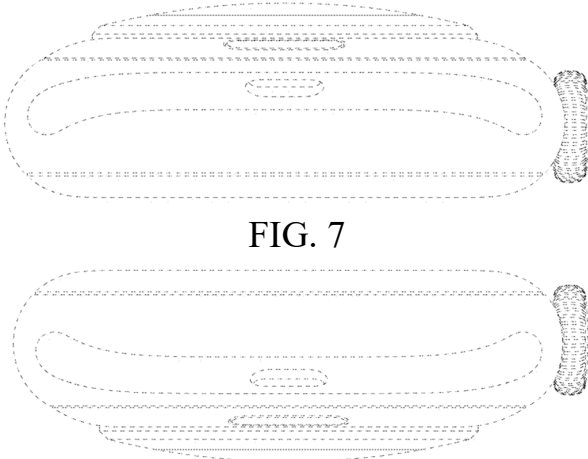
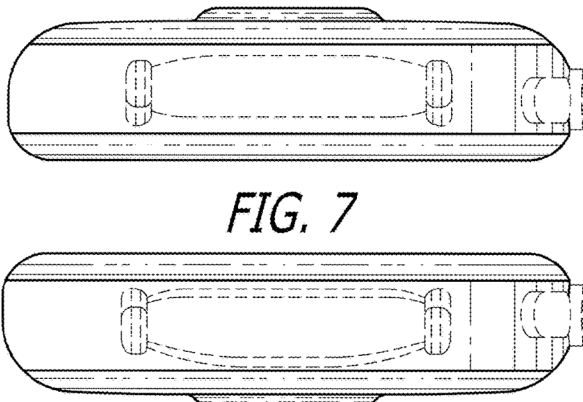
It is thus my opinion that the design claimed by the D'842 Patent would have been obvious to a DOSA over Yuen, Mendelson, and Bushnell.

D. [Ground 3] The Challenged Claim of the D'842 Patent Would Have Been Obvious Over Fong Combined With Mendelson and Bushnell

1. Fong Is A Primary Reference for the D'842 Patent

107. As shown in the comparison below, the design characteristics of Fong are basically the same as the claimed design:

D'842 Patent	Fong (Exhibit 1008)
 FIG. 2	 FIG. 2
 FIG. 4	 FIG. 4

D'842 Patent	Fong (Exhibit 1008)
 FIG. 5 FIG. 6	 FIG. 5 FIG. 6
 FIG. 7 FIG. 8	 <i>FIG. 7</i> <i>FIG. 8</i>

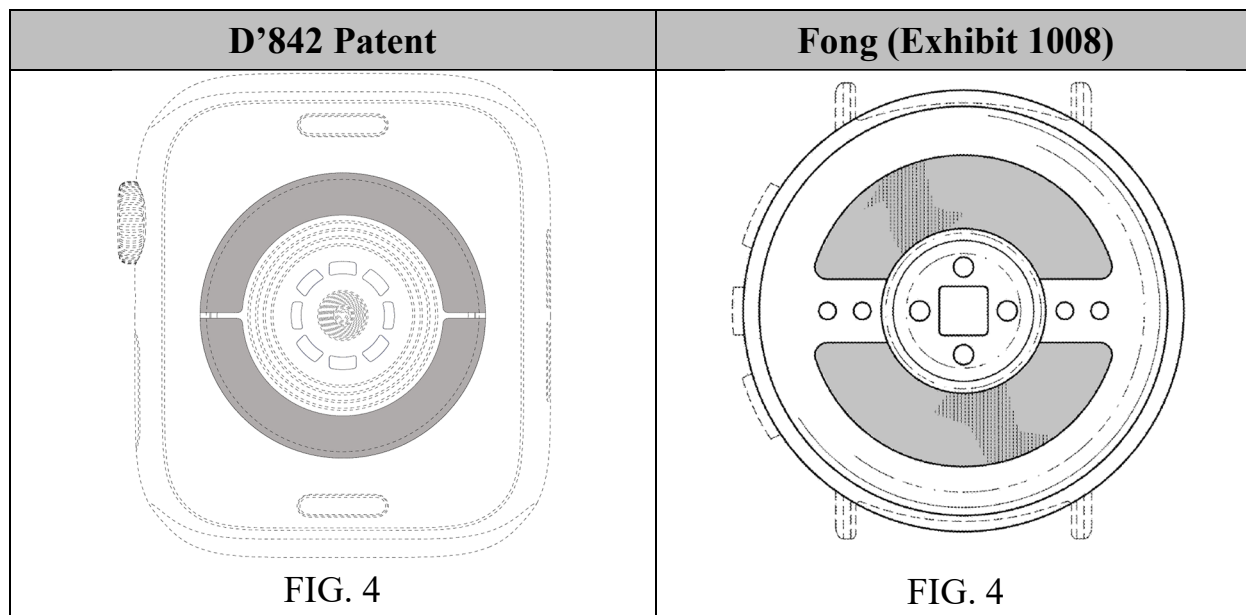
The above comparison demonstrates that Fong is an appropriate primary reference because its design conveys basically the same overall visual impression as the claimed design. *Compare* Exhibit 1001, FIGS. 2, 4-8 *with* Exhibit 1008, FIGS. 2, 4-8. Additionally, the following comparison of the respective design aspects of Fong

and the claimed design demonstrates the overall visual similarity between these designs.

a. Arc-Shaped Portions

108. As explained above in Section VIII.A.2, the claimed arrangement of the arc-shaped portions is a functional element. Therefore, I understand this aspect should be disregarded in the obviousness analysis.

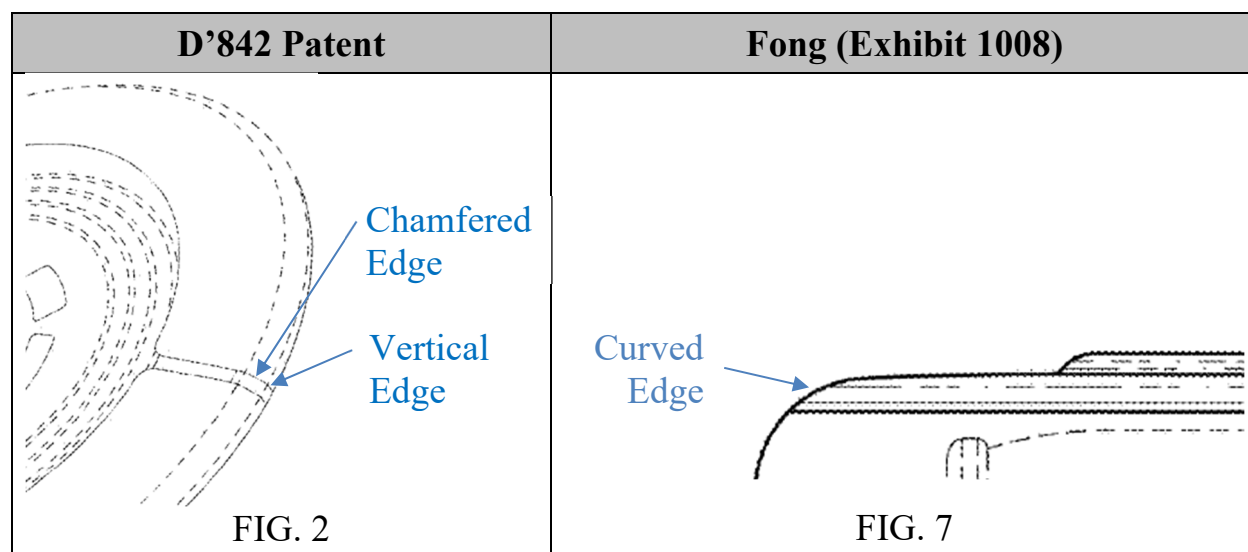
109. If the claimed arrangement of the arc-shaped portions is considered, Fong and the D’842 Patent provide the same overall visual impression, as shown below. Exhibit 1001, FIGS. 2, 4; Exhibit 1008, FIGS. 2, 4.



As shown above (right), the arc-shaped portions of Fong’s design are slightly wider and farther apart than in the claimed design, but a DOSA would have understood that such a difference, or any differences in the size, shape, or spacing of the arc-shaped portions of Fong and the claimed design, do not change the overall visual

similarity between those designs. Exhibit 1001, FIGS. 2, 4; Exhibit 1008, FIGS. 2, 4. Any differences between the claimed design and Fong, such as the shape, size of, or spacing between arc-shaped portions, would have been changes that a DOSA would have been motivated to make, as I have explained in Section IX.D.3 below.

110. As I have explained above in Section VIII, a DOSA would have understood that the D’842 Patent does not claim the arc-shaped portions’ sidewalls. However, if the D’842 Patent claimed the sidewalls depicted in FIG. 2, the chamfered edges are functional elements, as explained above in Section VIII.A.2. Therefore, I understand that the chamfered edges, if they are claimed, should be disregarded in the obviousness analysis. Moreover, if the sidewalls depicted in FIG. 2 of the D’842 Patent are claimed and considered, Fong’s design differs slightly because its sidewall has the curved edge shown below. Exhibit 1001, FIG. 2; Exhibit 1008, FIG. 7.



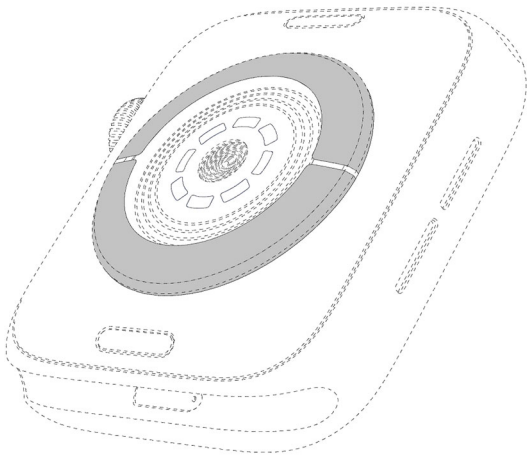
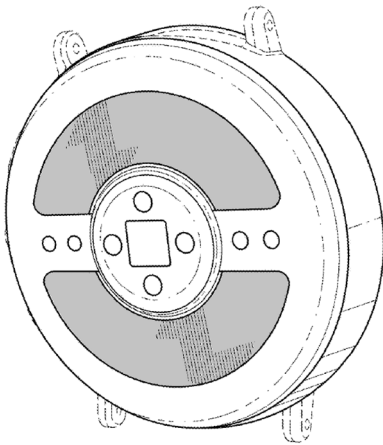
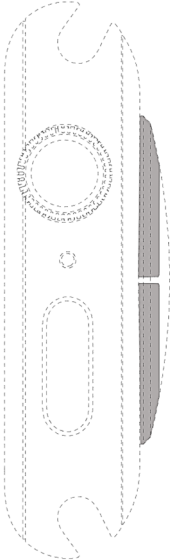
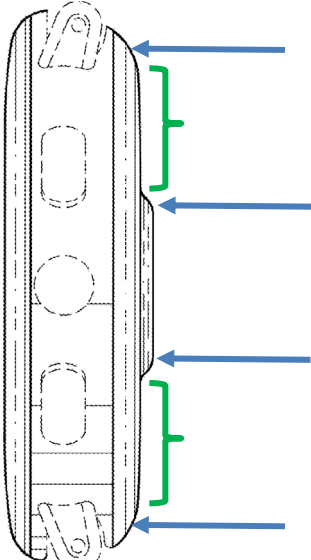
However, a DOSA would have understood that any differences between the design of Fong and the claimed design do not alter the same overall visual impression provided by Fong and the claimed design. Exhibit 1001, FIG. 2; Exhibit 1008, FIG. 2.

111. Accordingly, in my opinion, Fong discloses an arrangement of arc-shaped portions with basically the same design characteristics as the claimed design.

b. Convex Curvature

112. As explained above in Section VIII.A.1, the claimed convex curvature of the arc-shaped portions is a functional element. Therefore, I understand this aspect should be disregarded in the obviousness analysis.

113. If the claimed convex curvature of the arc-shaped portions is considered, the below figures show that Fong and the claimed design have arc-shaped portions with a convex curvature that provides the same overall visual impression. Exhibit 1001, FIGS. 2, 5-8; Exhibit 1008, FIGS. 2, 5-8.

D'842 Patent	Fong (Exhibit 1008)
 FIG. 2	 FIG. 2
 FIG. 6	 FIG. 5

As I have identified with green brackets above, Fong's arc-shaped portions are included on a convex curvature. Exhibit 1008, FIG. 5. Additionally, as I have identified with blue arrows above, there are convex curvatures included along the back surface Fong's design. *Id.* A DOSA would have understood that any difference between the design of Fong and the claimed design did not alter the overall visual

similarity of Fong and the claimed design as a whole. Exhibit 1001, FIGS. 2, 5-8; Exhibit 1008, FIGS. 2, 5-8.

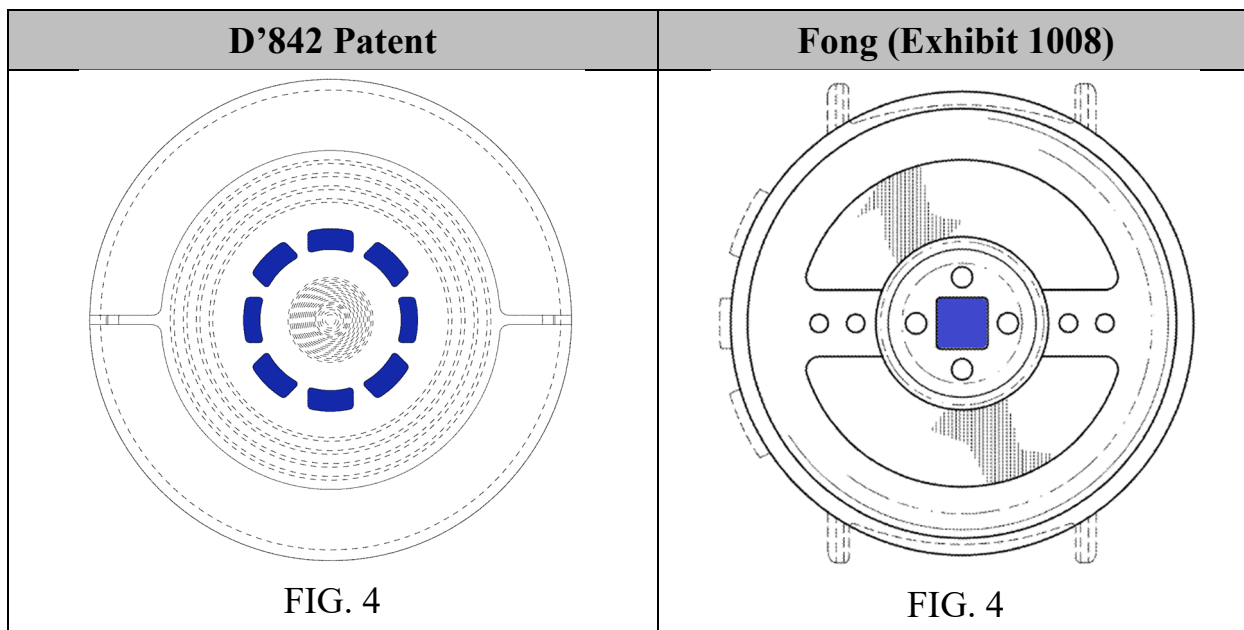
114. Accordingly, in my opinion, Fong discloses arc-shaped portions with a convex curvature with basically the same design characteristics as the claimed design.

c. Arrangement of Rectangles

115. As explained above in Section VIII.A.3, the claimed arrangement of rectangles is a functional element. Therefore, I understand that the arrangement of claimed rectangles should be disregarded in the obviousness analysis.

116. If the arrangement of rectangles claimed by the D'842 Patent is disregarded, a DOSA would understand that the claimed design covers any arrangement of rectangles surrounded by, and spaced apart from, the claimed arc-shaped portions. Exhibit 1001, FIGS. 2, 4. Fong's design has these same basic design characteristics, as explained below.

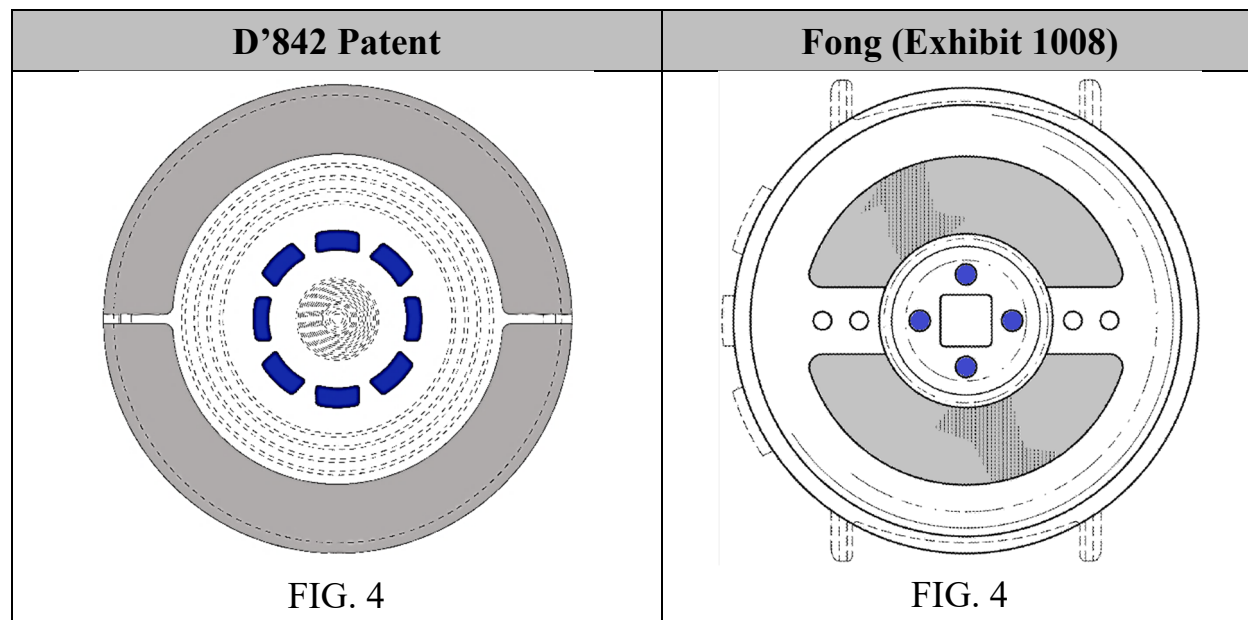
117. As explained above in Section IX.A.3, a DOSA would have understood that the central optical sensor of Fong's design was a PPG sensor that included a rectangular photodiode, as shown in blue below (right).



As shown above (left), the claimed design includes a circular arrangement of rectangles. As such, a DOSA would have understood that both Fong and the claimed design provide the same basic design characteristics because both include one or more central rectangles spaced apart from the arc-shaped portions. Exhibit 1001, FIG. 4; Exhibit 1008, FIG. 4. Also, in my opinion, Fong would still be an appropriate primary reference even if it did not include a central rectangle because of the overall visual similarity between the claimed design and Fong's design (*compare* Exhibit 1001, FIGS. 2, 4-8 *with* Exhibit 1008, FIGS. 2, 4-8).

118. Moreover, if the scope of the claimed design is found to include a circular array of eight rectangles shown in FIG. 4 of the D'842 Patent (below, left), Fong differs slightly from the claimed design because a DOSA would have

understood that the circular array of basic geometric shapes in Fong's design includes only the four circles shown in blue below (right).



This difference, however, does not change my opinion that Fong and the claimed design include basically the same design characteristics, for each of the reasons explained above in Section IX.B.1.c regarding this design aspect and Paulke.

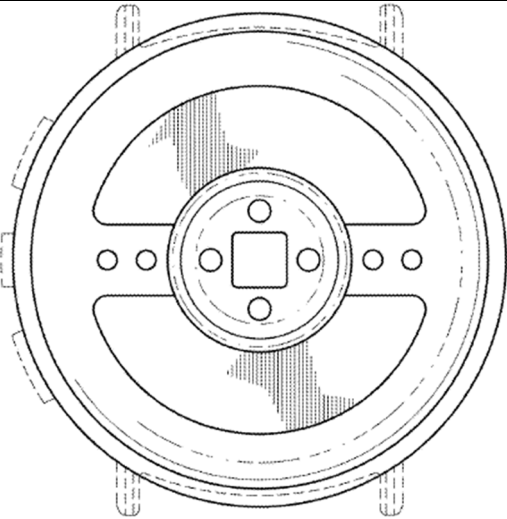
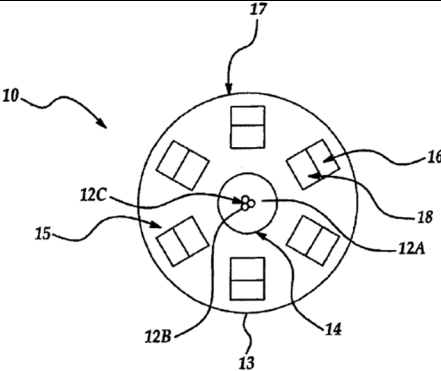
119. Accordingly, in my opinion, Fong discloses a design with the same basic design characteristics as the claimed design.

120. Overall, for the reasons above, it is my opinion that Fong is an appropriate primary reference because it discloses basically the same visual impression as the claimed design. If the claimed arrangement of rectangles is considered as part of the obviousness analysis, Fong's only difference from the claimed design is that Fong's circular array of basic geometric shapes has four

circles, not eight rectangles. If the sidewalls shown in FIG. 2 of the D'842 Patent are found to be within the scope of the claimed design, Fong would also differ slightly, as I have explained above in Section IX.D.1.a. However, as I have discussed below in Section IX.D.3, any difference between Fong and the claimed design was suggested by the prior art and was a change that a DOSA would have been motivated to make. Thus, in my opinion, Fong is a suitable primary reference despite any differences between its design and the claimed design.

2. Mendelson and Bushnell Are Appropriate Secondary References to Combine with Fong

121. As shown below, the design of Mendelson's circular PPG sensor is so related to Fong's design that the appearance of Mendelson's circular PPG sensor would have suggested that a DOSA combine Mendelson's features, including its circular array of six or twelve rectangular photodiodes, with Fong's device.

Fong (Primary)	Mendelson (Secondary)
 Exhibit 1008, FIG. 4	 EX. 1011, FIG. 7

Fong's design includes metal, arc-shaped electrodes surrounding its central PPG sensor, which includes a central rectangular photodiode surrounded by four circles, as shown above (left) and as I have described above in Section IX.A.3.

122. As shown above, Mendelson's FIG. 7 PPG sensor (right) has a circular shape that is especially suitable for the circular area occupied by Fong's central PPG sensor (left). Exhibit 1008, FIG. 4; Exhibit 1011, FIG. 7. This similarity between the circular shape of Mendelson's sensor and the central PPG sensor of Fong would have suggested to a DOSA to use Mendelson's sensor with Fong's device, as shown in the following composite figure.

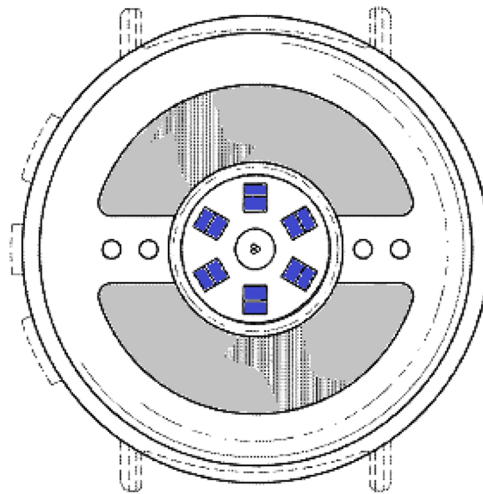
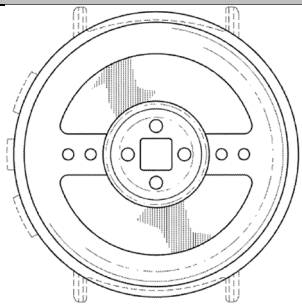
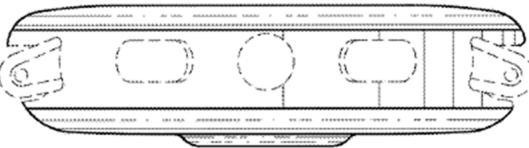
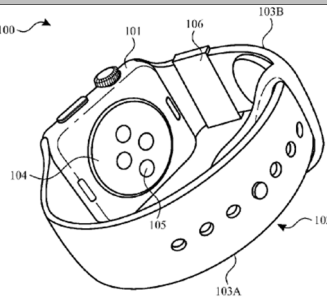
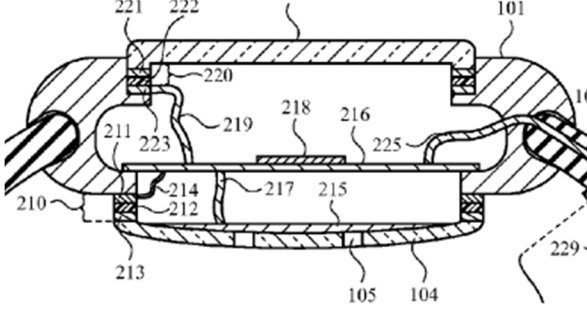


Exhibit 1008, FIG. 4 (composite figure including Mendelson's sensor (Exhibit 1011, FIG. 7) as Fong's central PPG sensor). Additionally, a DOSA would have understood that Fong and Mendelson are related because the prior art suggests combining wearable devices like Fong with a suitable PPG sensor, and Mendelson

is a suitable PPG sensor for Fong's device. Exhibit 1006, 15:9-18; Exhibit 1007 ¶41; Exhibit 1014 ¶94. Also, a DOSA would have understood that the designs were related because Fong and Mendelson's PPG sensors require the same basic components, including a light source (such as LEDs) and light detector(s) (such as photodiodes). Exhibit 1014 ¶¶75, 77. A DOSA also would have understood that Fong and Mendelson's designs were related because both use common design aspects, including a symmetrical circular array of simple geometric shapes on a PPG sensor with an overall circular shape. Exhibit 1008, FIG. 4; Exhibit 1011, FIG. 7. Therefore, given the relatedness and similarity of Fong and Mendelson's designs, the appearance of Mendelson's FIG. 7 sensor would have suggested the application of its features, including its circular array of rectangular photodiodes, to the design of Fong's central PPG sensor. As such, it is my opinion that Mendelson is an appropriate secondary reference to combine with Fong.

123. Further, as shown below, the design of Bushnell's sensor is so related to Fong's design that the appearance of Bushnell's sensor would have suggested that a DOSA combine its features, including its housing component 104, with Fong's device.

Fong (Primary)	Bushnell (Secondary)
 Exhibit 1008, FIG. 4  Exhibit 1008, FIG. 6 (rotated)	 EX. 1009, FIG. 1A  EX. 1009, FIG. 2A

Fong’s design has arc-shaped electrodes, a central PPG sensor, and a convex, circular surface protruding from the back of the wrist-worn electronic device, as shown above (left) and in Section IX.A.3 of my Declaration. Similarly, Bushnell’s design includes electrodes, a central PPG sensor, and a circular surface protruding from the back of the wrist-worn electronic device. Exhibit 1009, FIGS. 1-7, ¶¶40, 48 (“the health sensor 215 may be a photoplethysmogram (PPG) sensor that emits light through the sensor windows 105 into the user’s body part 230 and receives the portion of the transmitted light that is reflected back from the user’s body part 230.”), 74 (describing “multiple electrodes ... positioned on the [convex] housing component”).

124. Bushnell is so related to Fong because, as shown above, both sensor designs involve a circular surface that protrudes from the back of the wrist-worn electronic device and houses the devices electrodes and PPG sensor. Exhibit 1008, FIGS. 2, 4; Exhibit 1016, 2-3; Exhibit 1009, FIGS. 1A, 2A, ¶¶40, 48, 74. Additionally, the visual similarity between the sensor surface and the overall circular shape of Bushnell's housing component 104 (or 304, 404, 504, etc.) to Fong's convex protruding back surface would have suggested to a DOSA to use Bushnell's design for Fong's device. Exhibit 1008, FIGS. 2, 4-8; Exhibit 1009, FIGS. 1-7. Bushnell and Fong's sensor designs are also closely related because in both designs, the protruding surface (in Fong, the back surface including the arc-shaped portions and the central PPG sensor; in Bushnell, the housing component 104) incorporates the electrodes and the PPG sensor. Exhibit 1008, FIGS. 2, 4; Exhibit 1016, 2-3; Exhibit 1009, FIGS. 1-7, ¶¶40, 48, 74 (describing "multiple electrodes ... positioned on the [convex] housing component"). Bushnell and Fong's designs are further related because the prior art suggested combining wearable devices like Fong with known PPG sensor designs, which Bushnell discloses. Exhibit 1006, 15:9-18; Exhibit 1007 ¶41; Exhibit 1009 ¶48, FIGS. 1-2. A DOSA would have understood that the designs were further related because Fong and Bushnell's PPG sensors require the same basic components, including a light source (such as LEDs) and light detector(s) (such as photodiodes). Exhibit 1014 ¶¶75-76. Therefore, given the

relatedness and similarity of Fong and Bushnell's designs, the appearance of Bushnell's sensor design would have suggested the application of its features, including its convex housing component, to the design of Fong device. As such, it is my opinion that Bushnell is an appropriate secondary reference to combine with Fong.

3. **The Challenged Claim of the D'842 Patent Would Have Been Obvious to a DOSA Over Fong Combined with Mendelson and Bushnell**

125. For the reasons explained above in Section IX.B.3 regarding using Mendelson's sensor with Paulke's device, it is my opinion that using Mendelson's circular arrangement of photodiodes with Fong's device would have been a change that was suggested by the prior art (Exhibit 1006, 15:9-18; Exhibit 1007 ¶41) and well within the knowledge, experience, skill, and creativity of a DOSA in June 2018.

126. Additionally, in my opinion, a DOSA would have been motivated for a variety of reasons to use Mendelson's FIG. 7 sensor design with Fong's device. A DOSA would have understood that the prior art suggests combining wearable devices like Fong with a known PPG sensor design. Exhibit 1006, 15:9-18; Exhibit 1007 ¶41. As explained above in Section IX.B.3, Mendelson's FIG. 7 sensor is PPG sensor design that was well-known in the art. Thus, the prior art suggests combining Fong's device with Mendelson's PPG sensor design. *Id.* Also, the design of Mendelson's FIG. 7 sensor is so related to Fong, as discussed in the prior section,

that their relatedness would have suggested to a DOSA to combine Mendelson's sensor, including its circular arrangement of rectangular photodiodes, with Fong's device, as shown in the following composite figure. Exhibit 1008, FIGS. 2, 4, ¶41; Exhibit 1011, FIG. 7.

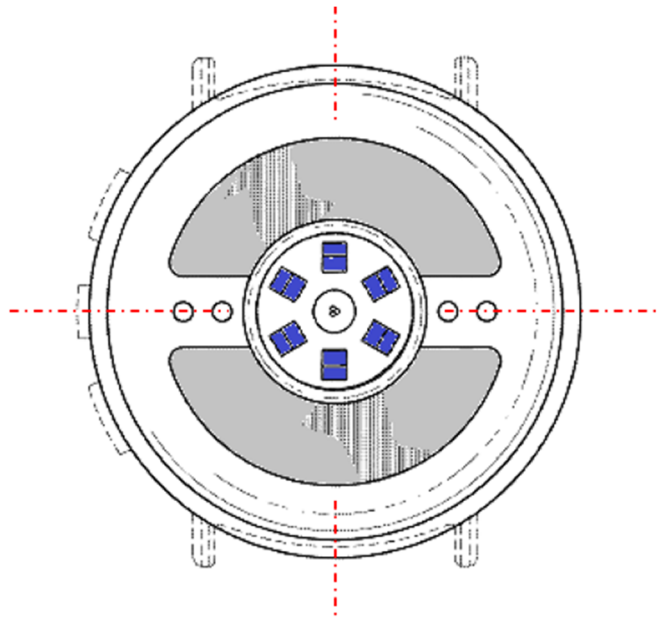


Exhibit 1008, FIG. 4 (composite figure combined with Mendelson's sensor (Exhibit 1011, FIG. 7), showing axes of symmetry in red). Additionally, for the reasons I have explained above in Section IX.B.3, a DOSA would have been motivated to combine Mendelson's FIG. 7 sensor design with Fong's device to provide a design with increased PPG sensor accuracy. A DOSA also would have been motivated to combine Mendelson's FIG. 7 sensor with Fong's device because, compared to Fong's design with its central square photodiode, the combination with Mendelson's circular design would be visually cohesive with the overall circular shape of Fong's

device and the circular shape formed by Fong's arc-shaped electrodes. Exhibit 1008, FIGS. 3-4. A DOSA also would have been motivated to combine Fong's device with one six-photodiode array from Mendelson instead of two concentric six-photodiode arrays, as shown in the following composite figure, for the reasons explained above in Section IX.B.3.

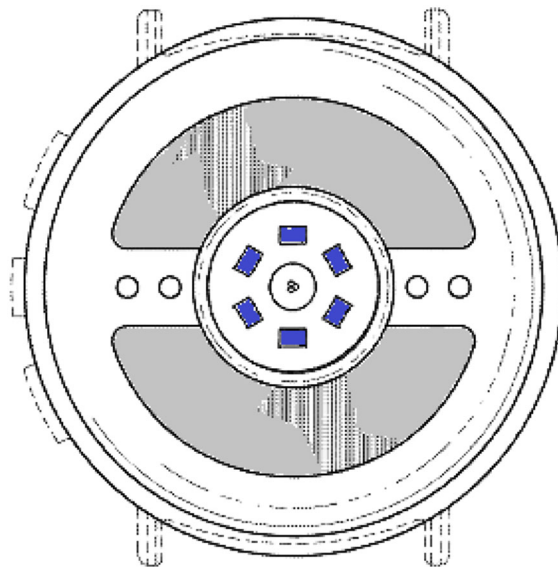
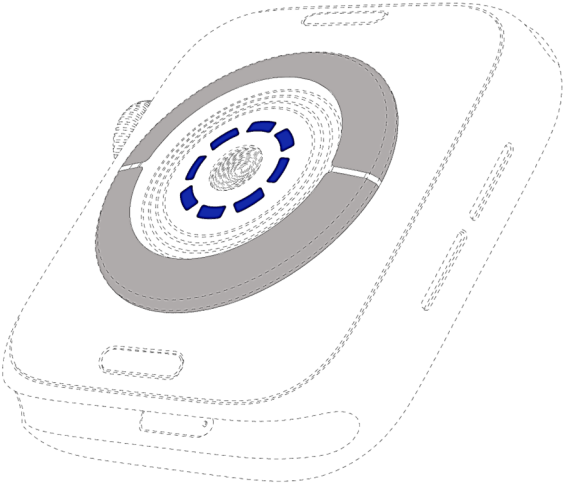
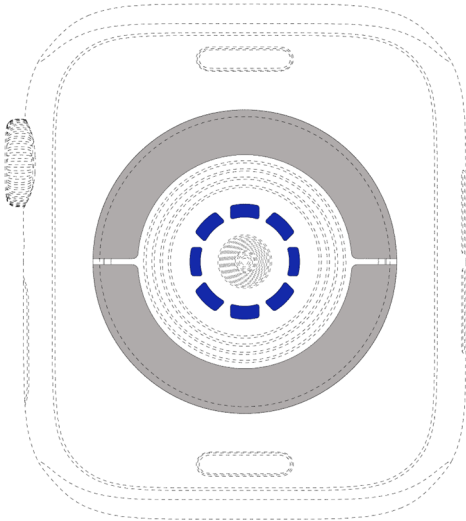


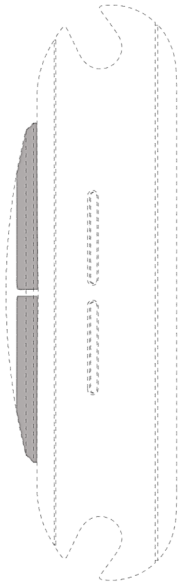
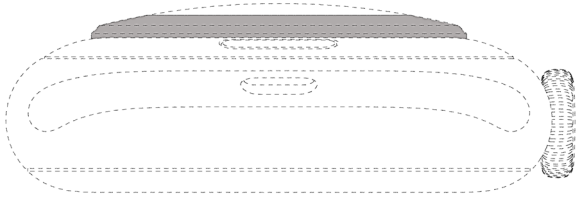
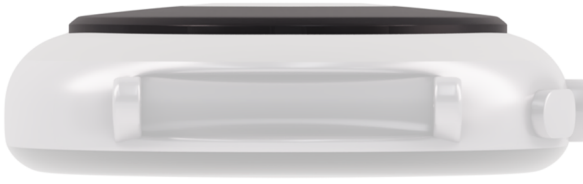
Exhibit 1008, FIG. 4 (composite figure combined with one six-photodiode array from Mendelson's sensor (Exhibit 1011, FIG. 7)). Lastly, for the reasons I have explained above in Section IX.B.3, the differences between the proposed combination shown in the composite figure above (i.e., a circular array of six straight rectangles) and the claimed design (i.e., a circular array of eight curved rectangles) would have been changes that a DOSA would have been motivated to make. Accordingly, it is my opinion that a DOSA would have been motivated for numerous

reasons to combine Mendelson's FIG. 7 sensor design with Fong's device as proposed herein.

127. Moreover, in my opinion, combining Bushnell's housing component 104 with Fong's device would have been a change that was suggested by the prior art and well within a DOSA's capabilities, for the reasons I have explained above in Section IX.C.3. Further, in my opinion, a DOSA would have been motivated for a variety of reasons to combine Bushnell's housing component 104 design with Fong's device, for the reasons I have explained above in Section IX.C.3. Lastly, for the same reasons I have explained above in Section IX.B.3, any differences between the proposed combination (of Fong with Mendelson and Bushnell) and the design claimed by the D'842 Patent were taught by the prior art and were changes that a DOSA would have been motivated to make.

128. Therefore, for the foregoing reasons, it is my opinion that a DOSA would have been motivated to combine Fong with Mendelson's FIG. 7 sensor and Bushnell's convex housing component to create a sensor, as shown in the composite figures below, that provides the same overall visual appearance as the design claimed by the D'842 Patent. The following composite figures accurately reflect my analysis above and show how a DOSA would have combined Fong with Mendelson and Bushnell.

D'842 Patent	Fong Combined with Mendelson and Bushnell
 FIG. 2	
 FIG. 4	

D'842 Patent	Fong Combined with Mendelson and Bushnell
 FIG. 5	
 FIG. 7	

It is thus my opinion that the design claimed by the D'842 Patent would have been obvious to a DOSA over Fong, Mendelson, and Bushnell.

X. CONCLUSION

129. For these reasons, it is my opinion that the Challenged Claim of the D'842 Patent would have been obvious to a designer of ordinary skill in the art. For the reasons I have explained, Masimo's IPR petition shows that the Challenged Claim of the D'842 Patent would have been obvious to a designer of ordinary skill in the art at the relevant time in June 2018.